P. Reilly

Onboard Sampling of the Rockfish and Lingcod Commercial Passenger Fishing Vessel Industry in Northern and Central California, 1992

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Abstract

In 1992 fishery technicians sampled 230 commercial passenger fishing vessel (CPFV) trips targeting rockfish and lingcod from the port areas of Fort Bragg, Bodega Bay, San Francisco, Monterey, and Morro Bay. The skippers of 44 vessels, and 2,190 anglers, cooperated in the study. Species composition by port area and month, catch-per-unit-effort, mean length, and length frequency of lingcod and the 18 most frequently observed rockfish species are presented, as well as fishing effort relative to time, depth, and distance from port. Total catch estimates based on unadjusted and adjusted logbook records are summarized.

Average catch of kept fish per angler day was 12.6 and average catch of kept fish per angler hour was 4.0. A continuing trend of an increasing frequency of trips to deep (> 40 fm) locations was observed in the Bodega Bay, San Francisco, and Monterey areas. Bodega Bay and San Francisco showed the highest frequency of trips to distant locations.

Sixty species comprised of 29,731 fish were observed caught during the study. Rockfish comprised 93.5% by number of the total observed catch. The five most frequently observed species were blue, yellowtail, widow and rosy rockfishes, and bocaccio, with lingcod ranking eighth.

CPFV angler success, as determined by catch per angler hour, generally increased in all ports in 1992 compared to previous 1988-91 data (Reilly et al. 1993). However, port-specific areas of major concern were identified for chilipepper, lingcod, and black rockfish, and to a lesser extent brown, canary, vermilion, yelloweye, widow and greenspotted rockfishes. These areas of concern included steadily declining catch rate, steadily declining mean length, and/or a high percentage of sexually immature fish in the sampled catch.

Recent sampling of the commercial hook-and-line fishery in northern and central California indicates that most rockfishes taken by CPFV anglers are also harvested commercially.

Dedication

This report is dedicated to Tabb Vadon. We will not forget his hard work, his love of the sea, his engaging smile nor his wild pig jerky.

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Introduction

The Central California Marine Sport Fish Project has been collecting angler catch data from the commercial passenger fishing vessel (CPFV) industry for several decades in order to continually assess the status of this valuable recreational fishery. The project focuses on rockfish and lingcod angling and does not sample salmon trips. Until recently, catch information was obtained on a general port basis from dockside sampling of CPFVs (also called party boats). This did not allow documentation of specific areas of importance to recreational anglers and was not sufficient to assess the status of rockfish populations at specific locations.

Sport anglers and the CPFV industry have expressed serious concern about the decline in the quality of fishing for rockfish and lingcod in central and northern California. Specifically, they believe the sizes of fish have decreased, catch rates have decreased, and that they must travel farther from port to achieve bag limits of quality (i.e. large) fish. Declines have been attributed by them in part to commercial fishing activities at or near locations fished by sport anglers.

CPFV operators are required by law to record total catch and location for all fishing trips in Department-provided logbooks. Historically, the Department relied upon dockside sampling and logbook data to assess the rockfish sport fishery in central and northern California. Unfortunately, the species composition of the catches could not be determined from the logbooks and the dockside checks often found that most fish had already been filleted. Because data collected by these methods were too general for use in assessing the status of a multispecies rockfish complex on a reef-by-reef basis, it was necessary to place observers aboard vessels to record the information at sea.

Many rockfishes tend to be residential, underscoring the need for site-specific data. Rockfish catch data in the log books are not reported by species and information on location is only requested by block number (a block is an area of 100 square miles). Thus, there is a strong need to collect catch information aboard CPFVs at sea.

In May 1987 the Central California Marine Sport Fish Project began at sea sampling of the CPFV fleet. Data collection continued until June 1990, when state budgetary constraints precluded further sampling, resumed in August 1991, and continues at present. The program depends on the voluntary cooperation of CPFV owners and operators. Information for the period 1987-1991 was presented by Reilly et al. (1993).

This report presents information on catch composition, angler effort, catch-per-unit-effort, mean length, and length frequencies of nearshore sport fishes by port for the 1992 sampling period. Locations of specific fishing sites are confidential and will not be identified. Total catch and effort estimates are made based on industry logbook data and adjustments of logbook data from sampling information. Trends in catch composition and length frequency for selected species are also discussed.

Methods

Study Area

Angler catches aboard central and northern California CPFVs were observed from 12 ports in 1992, ranging from Fort Bragg in the north to Port San Luis (Avila Beach) in the south (Figure 1). In 1987 the program began in the Santa Cruz/Monterey area and was subsequently expanded to other ports.During 1992 data were collected at fishing locations ranging from Cape Vizcaino (ca. lat. 39°45'N) to Purisima Point (ca. lat. 34°45'N), a distance of approximately 300 naut. mi., and out to 150 fm. Fishery technicians, hired under contract with the Pacific States Marine Fisheries Commission (PSMFC), conducted sampling of catches aboard CPFVs. They were assigned to the following port groups: 1) Fort Bragg (FB); 2) Bodega Bay and Dillon Beach (BB); 3) Princeton (Half Moon Bay), Berkeley, Emeryville, and Richmond (SF); 4) Santa Cruz and Monterey (MT); and 5) San Simeon, Morro Bay, and Port San Luis (MB).

Description of CPFV Fleet

CPFVs targeting on rockfish and lingcod ranged in length from 26 to 102 ft and passenger capacity ranged from 6 to 120 persons (average capacity 44 persons). The number of CPFVs per port ranged from 1 to 12. Approximately 97 CPFVs fished for rockfish and lingcod in central and northern California in 1992, although many of these conducted trips infrequently. Forty-five of these vessels were in the San Francisco area, where only six reported more than 35 rockfish trips in 1992. Trips were usually one half or one full day, the latter typically departing

at 0700 and returning by 1600. One vessel out of Morro Bay occasionally operated a 2- or 3-day trip on weekends. The skippers of 44 CPFVs participated in the study in 1992.

Trip Selection

Trips were selected by technicians on a random basis from a complete list of known rockfish/lingcod CPFV operators for each port group. At each port area, CPFV boat operators were telephoned and asked if a boat was available. If the boat was either unavailable or full to capacity, or if the technician was refused passage, successive boats on the list were contacted until a boat trip was secured. Our overall goal was to sample 5% of all trips. Poor weather conditions, unavailability of trips, and constraints on weekend and charter trips (often full and unavailable for sampling) frequently hindered our sampling opportunities.

Sampling Procedures

Technicians were initially trained in marine fish species identification. Each technician was equipped with foul weather gear, gloves, clipboard, waterproof data sheets, fish length measuring board, lead pencils, and field guides to California marine fishes. Three basic forms were used for data collection: trip form (Appendix A); species count form (Appendix B); and length form (Appendix C). At the start of each trip, the technician asked the vessel captain for the number of paid and unpaid anglers (the latter was increased if the captain and/or deckhand fished during the trip). Department of Fish and Game vessel number, port code, departure time, type of fishing trip (offshore, nearshore, surface, bottom, mix), and type of fishing tackle used were recorded on the trip form.

When the vessel arrived at a fishing location, the technician: recorded depth in fathoms, and either latitude and longitude or LORAN coordinates (which were provided by the captain of the vessel), or land bearings, and the time when fishing lines were lowered. Once the captain called for all fishing to end and the last fishing line was raised, time and depth were again recorded and the process was repeated throughout the day. New location coordinates were assigned only when the technician determined that the vessel had moved to a different location, as defined under "Shoreside Data Processing".

At the first fishing location, the technician chose a reasonable number of anglers to observe throughout the trip and recorded this number (usually less than 20 and located in the stern). In most cases, this was less than the total number of anglers aboard the vessel. To avoid sample bias, technicians were careful not to influence the fishing activity of anglers by only advising them of catch regulations when asked. Using the species count form, the technician then identified and counted each fish caught by all observed anglers. If a fish could not be identified to species, it was recorded as "unknown", or to the lowest taxon possible. The ultimate fate of each observed fish was recorded as either kept, released, or used as bait. If the fish was released, the technician attempted to determine if it survived or died (in the latter case, it was often consumed by a pelican or gulls). If the fate of a released fish could not be determined, it was recorded as "fate unknown". The combined catch by species for all observed anglers was recorded on one data sheet; individual catches per angler were not recorded.

All observed fish were separated by location on the species count form. If the technician could not determine whether one location was different from a previous one, it was considered to be different until the locations could be compared using nautical charts.

When fishing had ceased for the day, the technician measured the total length (TL) in mm of as many observed kept fish as possible by marking the length of each fish on a plastic measuring board, keeping all species separated. Not all observed kept fish were measured due to the refusal of some anglers to have their catch examined, or to early filleting by the deckhand. When time permitted, fish caught by unobserved anglers also were measured. The total number of kept fish that were measured often did not equal the total number of kept fish that were observed caught.

Additional data were recorded on reproductive condition of fish, weather and sea conditions, commercial fishing activity in the area, and sightings of marine birds and mammals.

Shoreside Data Processing

All fish lengths on the measuring board were determined to the nearest mm and transferred to the length data form by species. Technicians assigned fish lengths to single locations when appropriate.

Confidential codes were assigned to each unique fishing location after plotting the location on a nautical chart. Unique fishing locations were defined as circular areas separated from other locations by a minimum distance depending on depth. For depths less than 20 fm, location centers were no closer than 0.5 naut. mi. to other locations. For depths between 20 and 40 fm, location centers were no closer than 1.0 naut. mi. to each other. For depths greater than 40 fm, location centers were no closer than 2.0 naut. mi. to each other.

Data Entry and Analysis

Data were entered into dBASE (Ashton Tate) databases by technicians using a C program. Technicians edited their own data before transferring it to the Monterey office. Project biologists checked the edits in Monterey where summaries and graphical displays were produced using dBASE, Lotus 123 (Lotus Corp.), and Sigma Plot (Jandel Scientific) software programs. Statistical analyses of species composition, catch rates, and length frequency data will be presented in a subsequent administrative report.

Catch Per Angler Day and Catch Per Angler Hour

Catch per angler day (CPAD) is the average catch per angler per day for one or more port areas. Catch per angler hour (CPAH), also an average, was calculated by adding the products of the number of observed anglers and the fishing time in hours on each trip and dividing this into the total number of fish caught, for one or more port areas, months or fishing locations. This standardized the catch rate by weighting by fishing time in order to compare angler success.

Mean Length and Catch Per Angler Hour by Location

In order to compare average length, CPAD, and CPAH of selected sport fish relative to distance from port and depth, fishing locations were defined as either "near" or "distant", and as "shallow", "mixed", or "deep". Near locations were defined as having the location center less than or equal to 10 naut. mi. from any sampled port. Distant locations were defined as having the location center greater than 10 naut. mi. from all sampled ports. This partitioning was based on a tagging study by Miller and Geibel (1973), in which all tagged fish returned by CPFV anglers were caught within 10 naut. mi. of a port area, indicating low or no utilization of more distant fishing areas.

Shallow and deep fishing locations were defined as ones in which all observed depths during sampling trips were less than or greater than 40 fm, respectively. A mixed location was defined as one in which observed depths were greater than and less than, or exactly equal to, 40 fm during the study period. These criteria also were based on work by Miller and Geibel (1973), who reported a change in rockfish species composition north of Point Arguello (lat. 34°35'N) at approximately 240 ft (40 fm).

Length Frequency Histograms

Length frequency histograms are presented for lingcod and the 18 most frequently observed rockfish species by port area for samples of at least 20 fish. Total length intervals of either 5 or 10 mm are used, based on the maximum total length of the species, with the upper boundary of every fifth or tenth interval labeled on the X axis (i.e. 150 = 146-150 mm TL). One exception to this was for lingcod, where the 551- to 560-mm interval was partitioned into a 551- to 558-mm interval (less than minimum legal size) and a 559- to 560-mm interval; the latter was combined with the 561- to 570-mm interval. Note that while all length measurement scales along the x-axis remain constant between ports for each species, the frequency number scales along the y-axis may differ for a species from port to port, due to differences in sample size.

Estimated Total Catch and Effort

CPFV skippers are required to submit logs every month for each fishing trip made during the month. Logbook data includes number of fish caught, number of hours fished, number of anglers, and block number where the vessel fished. CPFV log data were obtained from the California Department of Fish and Game's (CDFG) database for 1992 to estimate total catch and effort for all marine sport fish except salmon in northern and central California. Interpretation and summarization of logbook data required several intermediate steps for meaningful comparisons with our sampling data. Logs from salmon trips and San Francisco Bay trips were eliminated. We restricted analyses to all northern and central California trips targeting only lingcod or rockfish.

Logbook data did not indicate target species; criteria used to eliminate trips targeting other species (e.g. sturgeon, striped bass, or salmon) were twofold.

First, rockfish or lingcod must have been caught on the trip (virtually eliminating striped bass or sturgeon trips.) Second, if salmon were caught, and the catch of all fish was less than four per angler, the trip was eliminated from the data set. The assumption was that this type of trip was likely targeting salmon rather than rockfish. We feel confident that these criteria were successful in establishing a realistic database.

The logbook data contained a number of multi-day trips taken from the Morro Bay area. To standardize these trips relative to total number of angler days, number of anglers was either doubled or tripled on these trips, depending on whether it was considered a 2- or 3-day trip.

Logbook data initially included all northern and central California ocean and bay ports and were combined into port groups. In general, these port groups corresponded to port groups in this study, with the exception of Crescent City, Eureka, Point Arena, Shelter Cove, and Trinidad (Figure 1) which were combined in a separate group labeled the "Northern California Group".

Tables were created for northern and central California ports, summarizing the total number of kept fish, total number of rockfish, lingcod, and other fish, total number of angler days, total number of trips, total number of hours fished, and average catch per angler day and per angler hour, based solely on log data.

Although logs are required for each fishing trip, all CPFV operators do not always submit logs for each trip. In order to estimate the total catch and effort for central and northern California it was necessary to determine what proportion of the logs were missing. We determined a compliance rate for each port group using the total number of trips we observed (known fishing trips) and checking for each of those trips in the logbook data. Thus the **compliance rate** is the number of observed trips which were logged divided by the total number of observed trips for that port group, expressed as a percentage.

Additional tables are presented with total estimates adjusted by compliance rate and sampling data for each port area. For each port area, the total number of fish caught was adjusted using the average observed catch per angler divided by the average logbook catch per angler on observed trips and applying this ratio to the total reported catch. The number of angler days was also adjusted; the ratio of observed total anglers to logged total anglers on observed trips was multiplied by the total number of logged anglers. Additional adjustments were made to total catch and total number of anglers based on log compliance ratios. No adjustments were made for the Northern California Group because those ports were not included in our sampling program during 1992.

Total catch estimates by port and year for lingcod, the 18 most frequently observed rockfishes, and other rockfishes were made based on adjusted catch estimates of total fish and the proportion of each species from sampling data.

Results and Discussion

From January through December 1992, technicians sampled 230 CPFV trips (Table 1) with 60 of those sampled trips (26.1%) occurring on weekends. Operators of 44 vessels cooperated in the study and six of those vessels were sampled at least 10 times each, accounting for 32% of the total sampling effort.

Total Observed Catch and Catch Per Angler Day

Technicians counted and identified 29,731 fishes (Table 1) comprising 60 species caught by observed anglers (Table 2). Of these, 27,534 (92.6%) were kept. Average CPAD for all fish, including those released or used for bait, from all port areas combined was 13.6. Average CPAD ranged from 12.3 in Fort Bragg to 16.9 in San Francisco. Kept fish CPAD averaged 12.6 and ranged from 10.9 in Fort Bragg to 15.3 in San Francisco. Average values of CPAD for all fish and kept fish exceeded those for all of the previous 4 years of our survey by 6-13%. Approximately 30 years earlier, Miller and Gotshall (1965) estimated average CPFV catch of kept fish from the Crescent City to Port San Luis area as 11.8, ranging from 5.3 in the Crescent City/Fort Bragg area to 14.8 in the Santa Cruz/Monterey area.

Total Species Composition

We observed sixty species of fish caught during the study (Table 2); 18 of these species individually comprised at least 1.0% of the observed catch. Of these, 16 species were rockfishes. Nine species were each represented by one individual, and 21 others each comprised less than 1.0% of the catch. Three of the eight species not previously observed in the

CPFV catch from 1987 to 1991 (California sheephead, Pacific barracuda, and queenfish) are southern California expatriates whose occurrence is most likely related to relatively warm ocean temperatures associated with the 1992-93 El Niño event. A list of observed species caught by CPFV anglers over the entire 6 years of our study can be found in Appendix D.

The 10 most frequently observed species overall were, in order of abundance, blue rockfish, yellowtail rockfish, widow rockfish, rosy rockfish, bocaccio, chilipepper, olive rockfish, lingcod, vermilion rockfish, and canary rockfish.

Eighteen species accounted for 96% of the observed catch and 27 species comprised 99% of the observed catch. Thirty-two species of rockfishes were caught, comprising 93% of the catch. Seventeen of the twenty most frequently observed species were rockfishes. Bocaccio, chilipepper, and blue, yellowtail, widow, and olive rockfishes are primarily schooling species as adults. These species comprised 66.4% of the total observed catch. Catch rates for these species are generally higher than for non-schooling species.

Although fishing effort and sampling effort were not evenly distributed among port areas, some general statements can be made regarding the relative abundance of certain species in the observed CPFV catch. Blue, yellowtail, widow and olive rockfishes as well as lingcod were among the 10 most frequently observed species in all port areas sampled, accounting for 61% of the total observed catch. In addition, rosy and canary rockfishes were important components of the catch in most port areas, while chilipepper were locally important in the Monterey and Bodega Bay areas. These eight species comprised 78.4% of the total observed catch.

A recent assessment of rockfishes known to occur off California found that 59 species are harvested by either sport or commercial fisheries (Lea 1992). Forty-three species (73%) are caught in both fisheries (Appendix E); of these, 22 are considered to be relatively important in both fisheries based on historical and current information.

In 1992 we found that 15 of the above 22 rockfish species made up at least 1.0% of the observed CPFV catch. Cowcod, black-and-yellow, China, flag, kelp, speckled, and yelloweye rockfishes occurred infrequently. Thus, the rockfish resource continues to be shared extensively by sport and commercial fisheries.

The National Marine Fisheries Service and CDFG have routinely sampled offshore commercial trawl and gill net rockfish fisheries. Within the past 6 years, hook-and-line fisheries (longline, vertical set line, troll, and rod and reel) have become important components of the commercial rockfish fishery. During 1991 and 1992, Department biologists began a directed effort towards sampling these fisheries. Preliminary, unpublished data will be referred to here in discussing similarities and differences in species composition with the CPFV fishery.

Total Observed Fishing Effort

Technicians observed 2,190 anglers, or 53.7% of all anglers fishing on sampled trips. Mean number of observed anglers per sampled trip was 9.5 and ranged from 7.5 in the Fort Bragg area to 12.2 in the San Francisco area. Mean number of total anglers per sampled trip was 17.1.

We observed 702.3 hr of fishing time with an average of 3.05 hr per sampled trip, similar to the average from all port areas from 1987 to 1991 (Reilly et al. 1993). The Monterey area had the greatest average fishing time per trip, 3.2 hr, while the Fort Bragg area had the lowest, 2.7 hr (Table 3).

Average CPAD (for kept fish and all fish)from all port areas combined was higher in 1992 than reported in any of our previous study years between 1988-91 (Reilly et al. 1993).

Catch Per Angler Hour

Among all port areas surveyed, CPAH for all fish was lowest in the Monterey area and highest in the San Francisco area, ranging from 3.8 to 5.0 fish, respectively, and averaging 4.3 fish overall for the year (Table 1). The same was true for kept fish only where CPAH ranged from 3.6 in the Monterey area to 4.6 in the San Francisco area and averaged 4.0 overall. When compared with 1988-1991 data (Reilly et al. 1993), CPAH in 1992 increased in all port areas except Monterey. The Monterey area CPAH for kept fish declined by 16.2% to 3.6 from the 1987-1991 average of 4.3, while the Morro Bay area showed a 33.3% increase, from 3.0 to 4.0, during the same period.

Fishing Effort by Depth

Technicians identified and sampled at 151 discrete fishing locations, as defined previously, many of which were sampled on multiple occasions. Of 230 trips sampled from the five port areas, 37% fished exclusively at shallow locations, 37% fished exclu-

sively at deep locations, and 25% fished at either exclusively mixed locations or a combination of shallow, mixed, and deep locations (Table 4). Fifty-six percent of all fish observed caught were taken at either exclusively shallow or exclusively deep locations.

The Monterey area had the highest percentage of deep-location trips (64%), primarily due to the proximity of Monterey Submarine Canyon, while the Bodega Bay area ranked second with 50% of sampled trips fishing deep locations, primarily Cordell Bank. Conversely, the Fort Bragg and San Francisco areas had the highest percentages of shallow-location trips, 78% and 50% respectively. Morro Bay and San Francisco had the highest number of sampled trips to mixed depths at 38% and 34%, respectively.

Fishing Effort by Distance from Port

Of the 151 discrete locations identified, 89 were "near" locations and 62 were "distant" locations. The Bodega Bay and San Francisco areas had the highest percentages (>50) of "distant" locations, while the Fort Bragg and Morro Bay areas had relatively low percentages (<15) of "distant" locations.

For all port areas combined, 62% of the 230 trips sampled fished at "near" locations, 29% fished in "distant" locations, and 9% fished in a combination of "near" and "distant" locations (Table 5). Compared to our 1988-1991 data (Reilly et al. 1993), the percentage of "distant" trips (ranging from 32 to 35%) changed very little.

More than 20 years ago Miller and Odemar (1968) noted that a trend was occurring in the San Francisco and Monterey port areas in which larger CPFVs were traveling to more distant fishing grounds. At present, virtually all of the study area's coastline is now reachable by CPFVs during a 1-day trip. As fishing success continues to remain lower in locations traditionally fished close to port, CPFVs continue to seek fishing locations farther from port which have sustained less fishing pressure.

Catch per Angler Hour by Distance from Port and Depth

With the exception of Fort Bragg, all port areas exhibited higher CPAH at shallow locations (<40fm.) than at deep locations (≥40 fm.;Table 6). This is somewhat to be expected due to the increased time needed to deploy and retrieve fishing lines at greater depths. Although CPAH was higher in shallow locations of Monterey, over four times more fish were ultimately caught in deep locations (due primarily to high catches of chilipepper and yellowtail rockfishes in deep locations). Fifty-one percent of the trips out of Monterey were to deep locations and only 16% were to shallow locations (Table 4).

In 1992, mean CPAH at shallow locations increased substantially from 1987-1991 averages (Reilly et al. 1993) for all port areas except Fort Bragg . In the San Francisco and Morro Bay areas, mean CPAH increased 110% and 60%, respectively, over the average from previous years. Substantial increases in mean CPAH at deep locations were also observed in the Fort Bragg, Bodega Bay, and San Francisco areas.

Mean CPAH was greater at distant locations compared to near locations in the Fort Bragg and Monterey areas (Table 7). In the Bodega Bay, San Francisco and Monterey port areas CPAH was greater at near locations, although the difference in Morro Bay was negligible. Substantial increases in CPAH for near locations compared with 1987-1991 averages were noted for the Bodega Bay, San Francisco, and Morro Bay areas (Reilly et al. 1993). Only modest increases or slight decreases occurred in mean CPAH in all port areas combined for "distant" locations compared with earlier data.

Fishing Effort by Single Location Trips

One measure of success in the CPFV industry is the frequency of trips made to a single location where presumably sufficient quantities of fish are present for all anglers to catch bag limits (15 rockfishes, 5 lingcod, 20 fish all species combined). Of 230 sampled trips, 133 (58%) fished at a single location, which was similar to previous years. Up to five discrete locations were fished on multiple location trips. As in previous years, the Fort Bragg area had the highest percentages of single location trips (83%) and the Bodega Bay area had the lowest percentage of single location trips (36%).

The above results do not account for the conscientious efforts of CPFV operators who deliberately fish at multiple locations on a single day to avoid "overfishing" specific locations.

Species Composition by Port Area

Fort Bragg Area

In the Fort Bragg area 12 species comprised 95% of the observed catch (Table 8). Blue, yellowtail,

and widow rockfishes accounted for 67% of observed fish caught. Overall, the 1992 species composition of the observed catch was 93% rockfishes.

By contrast, samples from the commercial hook-and-line fishery in 1992 indicated that chilipepper and yellowtail, yelloweye, vermilion, canary, and greenspotted rockfishes were the predominant species harvested (Pete Kalvass, CDFG, Fort Bragg, pers. comm.). Greenspotted rockfish were observed infrequently in the 1992 CPFV catch, and chilipepper were not observed at all. All rockfish species observed in the CPFV catch were present in commercial hook-and-line samples except olive and black-and-yellow rockfishes.

Bodega Bay Area

In the Bodega Bay area, 12 species comprised 95% of the observed catch (Table 9). Bocaccio, chilipepper, and yellowtail, blue, widow and canary rockfishes accounted for 82.9% of observed fish caught. Rockfishes comprised 97% of all species observed.

The five dominant species sampled in the commercial hook-and-line rockfish fishery in 1992 were bocaccio and chilipepper, yellowtail, widow and canary rockfishes (Tom Moore, CDFG, Bodega Bay, pers. comm.). All of these species ranked among the top 6 species in the observed CPFV catch, attesting to the considerable overlap in rockfish species utilization between sport and commercial fisheries in the Bodega Bay area. Twenty-one other species were found in commercial samples; of these, aurora, bank, blackgill, darkblotched, redbanded, sharpchin and splitnose rockfishes were not observed in the CPFV catch in 1992. Only cowcod, flag and starry rockfishes were sampled from the CPFV catch but not observed in commercial hook-and-line samples; all three species were minor components of the observed CPFV catch in the Bodega Bay area (although cowcod is highly desireable).

San Francisco Area

The San Francisco area CPFV sample had 14 species accounting for 95% of the catch (Table 10). Yellowtail and blue rockfishes comprised 54.5% of observed fish. Lingcod ranked 8th, a decline from 3rd in 1988 and 6th from 1989 to 1991 (Reilly et al. 1993). Black and brown rockfishes were more abundant compared with more southern areas, and Pacific sanddab was a fairly significant component of the catch. Chilipepper were absent from the catch, unlike the adjacent port areas of Bodega Bay and Monterey. Rockfishes comprised 93% of all species observed.

Kelp greenling and China, brown, gopher, and black-and-yellow rockfishes are all species indicative of shallow depth fishing, in this case generally less than 120 ft (20 fm). Although numbers are small, the relative abundance of these species decreased 83% from 1988-89 (Reilly et al. 1993) to 1992 (2.4% to 0.4% of the catch). Kelp and grass rockfishes were not observed in the sampled CPFV catch in 1992. This decreasing trend could be the result of a shift towards fishing in deeper depths or removal by commercial hook-and-line fishing.

Several significant changes have occurred in the relative abundance of species taken by CPFV anglers in the San Francisco area during the past 25 years. In 1966 Miller and Odemar (1968) observed black rockfish, a shallow water species, to be the most frequently observed species in the party boat catch, while rosy and widow rockfishes ranked 10 and 20, respectively. In 1992, black rockfish relative abundance dropped to rank 13, while rosy and widow rockfishes increased their relative abundance rankings in the catch to 3 and 4, respectively. This trend no doubt reflects the greater fishing effort in deeper water.

The most frequently occurring rockfish species in the San Francisco area commercial hook-and-line samples during 1992 were yellowtail, brown, rosy, canary, and greenspotted (Becky Ota, CDFG, Menlo Park, pers. comm.). Except for brown rockfish, these were all among the top 10 species in the observed CPFV catch. Twenty-one other rockfishes were sampled from the commercial catch; of these, only greenblotched, blackgill, bank, redbanded, and sharpchin rockfishes and Pacific ocean perch were not observed in the CPFV catch. Sport-caught rockfishes not found in commercial hook-and-line samples included olive, rosethorn, black-and-yellow, squarespot and redstripe. Of these, only olive rockfish comprised more than 1.0% of the observed CPFV catch.

Monterey Area

The Monterey area had the highest species diversity (44 species) of any port group (Table 11). Sixteen species comprised 95% of the catch, and rockfishes comprised 92% of the catch. Chilipepper and yellowtail and blue rockfishes comprised 48% of

the observed catch. Unique to this area and similar to previous years was the relatively high proportion of chilipepper in the sampled catch, primarily due to the proximity of the Monterey Submarine Canyon within the fishing grounds. Chilipepper often were targeted and comprised 14% of the observed catch. Until the 1980s, chilipepper was only a minor component of the CPFV catch (Oda 1992). A 1966 survey of the CPFV catch ranked chilipepper 13th in abundance among observed fishes in the Monterey area (Miller and Odemar 1968).

This port area was the only one in which canary rockfish were not among the 11 most frequently observed species. The shallow water species complex referred to in the San Francisco area discussion (gopher, brown, China and black-and-yellow rockfishes) was poorly represented at 0.9% of the observed catch.

Commercial hook-and-line samples in the Monterey area fall into three general categories. The offshore longline fishery catches primarily chilipepper, bocaccio, and yellowtail, blackgill, bank, widow, and speckled rockfishes (Bob Leos, CDFG, Monterey, pers. comm.). The hook-and-line fishery in the Monterey Bay area harvests mainly bocaccio and greenspotted, yellowtail, starry, yelloweye, speckled, and copper rockfishes. The nearshore hook and line fishery exists south of Big Sur, including the Big Creek Reserve area. Under agreement with the reserve manager, fishermen have been recording the composition of the catch caught outside of but landed at the reserve. Dominant species were black, blue, olive, kelp, grass, gopher, black-and-yellow, vermilion, and brown rockfishes.

All rockfish species identified in commercial samples were present in the observed 1992 CPFV catch except aurora, bank, black-and-yellow, blackgill, chameleon, darkblotched and splitnose rockfishes. For the 20 species of CPFV-caught rockfishes for which n>10, only the squarespot rockfish was not sampled in the commercial hook-and-line fishery in 1992.

Morro Bay Area

In the Morro Bay area, 15 species comprised 95% of the observed catch (Table 12), and rockfishes comprised 95% of species caught. Blue and yellowtail rockfishes comprised 47% of observed fish. The catch included a higher frequency of occurrence of vermilion and gopher rockfishes than seen in the other ports as well as the presence of California barracuda. The shallow water species (gopher, brown, black, kelp, grass, China and black-and-yellow rockfishes and kelp greenling) comprised 10.0% of the observed catch, the highest of the five areas. Of significance was a steady decline in the relative abundance of canary rockfish, from 6.5% in 1988 (Reilly et al. 1993) to 2.6% in 1992, and the relatively high percentage of olive and black rockfish in 1992. The occurrence of California barracuda in the Morro Bay area catch this year is indicative of the warmer water present during El Niño conditions in 1992.

Morro Bay commercial hook-and-line samples in 1992 consisted primarily of chilipepper, bocaccio, and yellowtail, vermilion, gopher, and blue rockfishes (Sandra Owen, CDFG, Morro Bay, pers. comm.). Except for chilipepper, all of these species comprise the top seven species in the observed CPFV catch; chilipepper ranked 28. Twenty-three other species were identified in commercial hook-and-line samples, and all of them were observed in the CPFV catch. Only three rockfish species caught incidentally by CPFV anglers (squarespot, rosethorn, and calico) were not observed in commercial samples.

Species Composition by Month

Fort Bragg Area

Twenty-three trips were sampled in the Fort Bragg area in 1992 with only March sampled more than three times. Sample size was small and few seasonal trends were apparent (Table 13). CPAH average for all fish ranged from 2.8 in August (two trips) to 11.3 in April (one trip). Only blue, widow and canary rockfishes were observed in all months sampled. Blue rockfish were caught more frequently in the spring (March, April) and fall (October, December), while yellowtail rockfish were caught more frequently in June, July and October. As expected, lingcod catch rates were highest from November to March, coinciding with spawning season.

Bodega Bay Area

Seasonal variations in CPAH were evident for some of the more common rockfishes. Blue rockfish were scarce or absent in the observed catch from February to April (Table 14). Yellowtail rockfish were most frequently caught from March to June and again in September. Except for January when no sampling occurred, the lowest average catch rate was

observed in August. CPAH for all fish exceeded 5.0 in February, May, and September. Only yellowtail and canary rockfishes and lingcod were observed in all months sampled.

San Francisco Area

Lingcod CPAH was highest in February and September (Table 15). Blue, yellowtail, rosy, widow, canary, starry and bocaccio rockfishes were observed caught in all months sampled. Pacific mackerel were caught between April and November with the highest CPAH in May and June. The lowest average catch rates were observed in December and February. CPAH for all fish exceeded 5.0 in March, May, June, September and October. Although only one trip was sampled in May, this month had the highest CPAH among all months and port areas sampled at 10.7.

Monterey Area

Blue rockfish dominated the catch this year from July to November, peaking in August with a CPAH of 2.7 (Table 16). Similar to previous years, chilipepper CPAH was higher than all other species in April and May although in previous years chilipepper also dominated the catch in June and July. These two species, along with yellowtail rockfish, olive rockfish, and bocaccio, were largely responsible for the highest overall CPAH of 7.4 and 4.8 in August and September, respectively.

Morro Bay Area

Few seasonal trends in CPAH for most rockfish species were apparent in the Morro Bay area during 1992. Similar to previous years, the Morro Bay area had the most narrow range of monthly CPAH for all fish among all areas (Table 17). Blue rockfish were caught more frequently from June through August of 1992, compared with August through November in previous years (Reilly et al. 1993). Blue rockfish and lingcod were the only species observed caught in every month of the year. Several rockfishes showed a narrow range in monthly CPAH. Yellowtail and vermilion rockfishes varied in monthly CPAH by factors of 3.1 and 3.0, respectively. These low variabilities are indicative of species that are widespread, abundant, and are either targeted (as yellowtail and vermilion are) or caught incidentally yearround. Lingcod showed a peak CPAH in November, coincident with the seasonal start of targeted fishing (usually in October or November).

Percentage of Fish Kept by Port

Approximately 93% of all observed fish were kept by CPFV anglers (Table 18), slightly less then the 95% observed between 1987-1991 (Reilly et al. 1993). The Fort Bragg area again had the lowest percentage of kept fish, although the San Francisco area showed the greatest decline (4.5%) over the previous 1988-91 average of 95.5%. Only the Bodega Bay and Morro Bay ports showed slight increases in kept fish percentages over their previous 4-year average.

Percentage of Fish Kept by Port and Species

Twelve of the twenty most frequently observed species for all areas combined were retained over 90% of the time; these were all rockfishes (Table 19). Species are presented in order of decreasing abundance in the total observed catch. Blue and rosy rockfishes and lingcod were the only species observed ($n \geq 10$) in the Fort Bragg area that were kept less than 90% of the time. In the Bodega Bay area, blue, rosy, and greenstriped rockfishes, lingcod, and Pacific mackerel were kept less than 90% of the time. All rockfish species in the San Francisco and Monterey areas, except blue (San Francisco only), and rosy, were kept more than 90% of the time. Blue and black rockfishes in the San Francisco area were kept substanially less frequently than the percentage seen during the 1988-91 period, from 95.7 to 85.9% and from 99.2 to 70.5%, respectively. This is an indicator of a higher proportion of smaller fish in the catch. In the Morro Bay area, rosy and greenstriped were the only rockfishes kept on the average less than 90% of the time.

Rosy and greenstriped rockfishes have maximum total lengths of less than 406 mm (16 in.) (Miller and Lea 1972). Observed rosy and greenstriped rockfishes discarded were often less than 305 mm (12 in.). Although there is no minimum size limit for rockfishes caught in California waters, length is the most important factor affecting retention for sport fish in general. Rosy rockfish accounted for 11% of the 2,199 observed fish returned (all species) and 69% of all rockfishes returned; this species was retained an average of 83.5% of the time for all areas combined.

A minimum legal size of 559 mm (22 in.) has existed for lingcod since 1981. In comparing all ports, the Morro Bay and Monterey areas were found

to retain lingcod less frequently than the others (54%) while the Bodega Bay area retained the highest percentage of those lingcod caught (78%).

Retention of Pacific mackerel was highly variable, ranging from 44% in the Bodega Bay area to 92% in the San Francisco area. Retention of Pacific sanddab was lower in the Monterey area compared with the San Francisco and Morro Bay areas.

Number of Fish Measured and Maximum Lengths

Fishery technicians measured 32,345 fishes during 1992. Maximum total lengths by port for all species for all years sampled, 1987 to 1992, are presented in Appendix F. In 1992 a new maximum total length was recorded for squarespot rockfish compared with that reported in Miller and Lea (1972).

Catch and Length Data for Nineteen Species

Blue rockfish, *Sebastes mystinus*

Blue rockfish was the most frequently caught fish in the CPFV fishery during 1992 with an average catch-per-angler-day (CPAD) ranging from 4.76 in Fort Bragg to 2.22 in Monterey (Table 20). CPAH for San Francisco and Morro Bay increased significantly over our 1987-1991 data (Reilly et al. 1993).

When data were compared by "near" and "distant" locations, CPAH for blue rockfish was higher from near locations in the Bodega Bay, San Francisco and Morro Bay areas (Table 21). In contrast, Bodega Bay and Morro Bay showed higher CPAH rates from distant locations during the 1988-1991 period (Reilly et al. 1993). Fort Bragg was the only port with higher CPAH from distant locations during 1992. CPAH in Monterey was similar for near and distant locations.

At "shallow" locations CPAH was higher at all port areas (Table 21). This is not unusual as blue rockfish typically occur from the surface to a depth of 300 feet (Miller and Lea, 1972). Only the Morro Bay area showed significant numbers of blue rockfish caught in "deep" locations.

Mean total lengths for blue rockfish for all locations in 1992 from San Francisco and Monterey areas generally increased over mean length in 1988-1991 (Reilly et al. 1993). Mean length varied by only 28 mm (1.1 in.) between ports (Table 22) with the majority of fish in the 250-350 mm (9.8-13.8 in.) length range. The Fort Bragg and Bodega Bay areas showed slight declines in mean total length in 1992, while the Morro Bay area was similar to previous years.

Mean length has varied by less than 20 mm (0.8 in.) between 1988-1992 for the Monterey and Morro Bay areas.

The Bodega Bay and Monterey areas showed greater mean lengths from distant compared to near locations by 44 and 25 mm (1.7 and 1.0 in.), respectively, possibly indicating less fishing pressure at distant locations (Table 22). San Francisco continued the trend of lower mean length at distant locations as observed in previous years (Reilly et al. 1993).

Blue rockfish were observed almost exclusively at shallow locations in all port areas except Morro Bay where greater numbers from deep locations were also observed. Although sample sizes at deep locations were very small from all areas except Morro Bay, mean lengths were found to be higher from the deep locations (Table 22).

Wyllie-Echeverria (1987) reported the length at 50% sexual maturity for blue rockfish to be 280 mm (11.0 in.) for males and 290 mm (11.4 in.) for females. In 1992 mean lengths from all port areas were slightly to significantly higher than these values.

Blue rockfish sampled from all ports showed similar length frequency distributions during 1992 (Figure 2). This length range corresponds to a relatively wide range of years and thus indicates a good mix of year classes with relatively constant recruitment. Morro Bay catches continue to contain the highest proportion of sexually immature fish among all areas.

Yellowtail rockfish, *Sebastes flavidus*

Yellowtail rockfish are considered a staple of the CPFV industry and were caught in abundance in all port areas sampled (Table 23). CPAH of yellowtail rockfish was highest in the San Francisco and Morro Bay areas in 1992 which differs from our previous 4 years of sampling (Reilly et al. 1993). Monterey area boats had the lowest observed CPAH, and the Fort Bragg and Bodega Bay areas showed declines from the previous 3 years.

In comparing near and distant location CPAH, higher catch rates were observed in distant as compared to near locations for all areas except Morro Bay, possibly indicating that CPFV operators are traveling farther from port in order to locate

schools of yellowtail rockfish (Table 24).

All areas had CPAH rates that were much higher at deep as compared to shallow locations (Table 24). Monterey area CPFVs often target more on chilipepper at deep locations during the late spring through summer period, thus the abundance and catch rate for yellowtail rockfish throughout the year relative to depth may be underestimated.

Mean length of yellowtail rockfish varied by 107 mm (4.2 in.), from 398 mm (15.6 in.) in the Bodega Bay area (primarily due to fish measured from Cordell Bank) to 291 mm (11.5 in.) in the Morro Bay area (Table 25). With the exception of the Fort Bragg area, all ports showed a general mean length decrease over 1991 mean lengths (Reilly et al. 1993).

Yellowtail rockfish from all port areas, with the exception of Fort Bragg, showed mean lengths as much as 104 mm (4.1 in.) higher for fish taken from deep locations as compared to those from shallow locations (Table 25). Love et al. (1990) reported juvenile yellowtail rockfish occurred at depths of 30 to 129 m (99 to 426 ft), while adults first appeared at 120 m (396 ft). Lea et al. (in press) described ontogenetic movement of young-of-the-year yellowtail rockfish from shallow to deep water in central California. Our data also support the premise of larger yellowtail rockfish occurring in deeper water.

Length frequency distributions indicate a wide length range of fish were available to CPFV anglers from the Bodega Bay, San Francisco and Monterey area ports (Figure 3). Fort Bragg and Morro Bay areas also showed a broad range of lengths, although the majority were more narrowly distributed. These observations are consistent with those of our previous 5-year study (Reilly et al. 1993). Wyllie-Echeverria (1987) reported length at 50% sexual maturity to be 340 mm (13.4 in.) for males and 370 mm (14.6 in.) for females. In all areas except Bodega Bay, mean lengths were below that of 50% sexual maturity for females.

Since 1991 the trend for most Fort Bragg fishing has been to more shallow locations (86% in 1992). This may account for the relatively small mean length and the paucity of yellowtail rockfish in the catch greater than 370 mm (14.6 in.), indicating that most of the fish were sexually immature.

Yellowtail rockfish from the Bodega Bay area ranged from 205 to 594 mm (8.1 to 23.4 in.) with a mean of 398 mm (15.7 in.). In the San Francisco area the length frequency distribution for yellowtail rockfish ranged from 199 to 545 mm (7.8 to 21.5 in.) but few were seen over 500 mm (19.7 in.). Based on length-age data from Lea et al. (in press), the majority of yellowtail rockfish in the CPFV catch from the San Francisco area were between 4 and 10 years old; a significant proportion were below the reported lengths at 50% sexual maturity.

The Monterey area catches contained a good mixture of year-classes in 1992 with fish ranging in length from 197 to 533 mm (7.8 to 21.0 in.) with a mean of 354 mm (13.9 in.) (Figure 3).

In the Morro Bay area, the length frequency distribution ranged from 156 to 553 mm (6.1 to 21.8 in.) with a mean of 291 mm (11.5 in.). The mean length varied by 18 mm (0.7 in.) from 1988 through 1991 (Reilly et al. 1993) and fell within that range in 1992. Similar to previous years, most fish were below the lengths at 50% sexual maturity indicating a cause for concern. Morro Bay area catches have consistently fallen within a limited size range of approximately 200 to 400 mm (7.9 to 15.7 in.) (Reilly et al. 1993) which is probably due to the fact that Morro Bay is near the southern end of the range for yellowtail rockfish abundance (Miller and Lea 1972). Alverson et al. (1964) lists the center of abundance for yellowtail rockfish from Oregon to British Columbia. CPAH has not declined during the past 5 years, and is actually higher in 1992 compared to the previous 4 years of study. It seems apparent that more juveniles are available in this area and are not necessarily dependent on local adult populations for successful recruitment. This would indicate that although most fish are immature, in general stocks are not being adversely impacted.

Widow rockfish, *Sebastes entomelas*

Widow rockfish CPAD and CPAH were highest in the Fort Bragg and Bodega Bay areas in 1992, and in the former area showed a 5-6 fold increase over values from 1991 (Reilly et al. 1993) (Table 26). All other port areas showed significant increases over 1991 values with CPAD and CPAH being two to six times higher.

In all but the Bodega Bay area, catch rates were higher at near locations compared with distant locations (Table 27). Except for the San Francisco area, CPAH was higher for deep locations compared to shallow; Monterey and Morro Bay area CPAH rates were 10 and 11 times higher, respectively (Table 27). Widow rockfish are known to occur to depths of 1,050 feet (Miller and Lea, 1972) so it is not surprising that most fish were caught predominately at deep locations.

Similar to previous years, mean lengths of widow rockfish were highest in the Bodega Bay area and lowest in the Fort Bragg area in 1992 (Table 28). When near/distant comparisons were made for all port areas sampled, we found widow rockfish were captured more frequently in the near locations of Fort Bragg, Monterey and Morro Bay and in the distant locations of Bodega Bay and San Francisco in direct proportion to the number of trips to those locations. Mean lengths at near and distant locations showed no trend. Although the sample size was small from near locations at Bodega Bay, this area showed the most pronounced difference in mean length of fish from distant locations (Table 28).

Mean lengths for widow rockfish were greater at all deep locations compared to shallow locations for all ports sampled except Fort Bragg (Table 28). Although only four fish were measured from deep locations in the San Francisco area, those fish averaged 130 mm (5.1 in.) or 44% longer than the 30 other fish measured from shallow locations.

Widow rockfish lengths from the Bodega Bay area showed the widest length range of all ports, as well as the highest proportion of large fish ranging from 401 to 550 mm (15.8 to 21.7 in.) (Figure 4). The majority of these fish were taken at distant, deep locations and may be from a stock that has not experienced heavy fishing pressure. Based on data from Lenarz (1987), those fish exceeding 450 mm (17.7 in.) were at least 12 years old.

Of concern in the widow rockfish CPFV fishery is the proportion of all fish which are sexually immature. Wyllie-Echeverria (1987) reported size at 50% maturity to be 360 mm (14.2 in.) and 370 mm (14.6 in.) for males and females, respectively. Only widow rockfish from the Bodega Bay area had a wide length distribution and a mean length greater than these values. With the exception of the Monterey and Bodega Bay areas, length frequency histograms from all other ports indicated catches of almost entirely sexually immature fish.

Rosy rockfish, *Sebastes rosaceus*

Rosy rockfish are one of the most frequently observed species but not considered desirable by many CPFV anglers due to their small size. Rosy rockfish CPAH generally declined from 1988 to 1991 in the Fort Bragg and Bodega Bay areas (Reilly et al. 1993) and continued this trend in 1992, but no consistent trend was observed in the San Francisco, Monterey and Morro Bay areas (Table 29). Catch rates were highest in the Fort Bragg and San Francisco areas.

No significant trends were observed in CPAH of rosy rockfish taken from near versus distant locations or shallow versus deep locations among all ports (Table 30).

Mean lengths of rosy rockfish declined in the Fort Bragg and Bodega Bay areas since our last report (Reilly et al. 1993) (Table 31). Mean length varied by only 27 mm (1.1 in.) among all port areas. This is not unusual for a species with a relatively small maximum length of 361 mm (14.2 in.) (R. Lea, Dept. of Fish and Game, Monterey, pers. comm.).

No distinct trends were evident for mean lengths of rosy rockfish taken from distant locations compared to near locations in the San Francisco, Monterey and Morro Bay areas (Table 31). Mean length was slightly higher at all deep locations compared with shallow locations. No conclusions could be reached from Fort Bragg, Bodega Bay, and Monterey area comparisons due to small sample sizes.

Wyllie-Echeverria (1987) reported rosy rockfish reach 50% sexual maturity at about 7 years and 200 mm (7.9 in.). All ports sampled showed mean lengths well above this and also showed that few juveniles are caught by CPFV anglers in general (Figure 5). Due to a relatively slow growth rate and small maximum length, mean lengths from all ports represent an age range of approximately 8 to 15 years, based on data from Lea et al. (in press). Although the sample size from Bodega Bay was small, the length frequency distributions from all ports seems to indicate relatively consistent recruitment.

Bocaccio, *Sebastes paucispinis*

Compared to 1990-91 (Reilly et al. 1993), bocaccio catches decreased substantially in the Bodega Bay and Monterey areas but no significant trends were evident for other areas (Table 32). Similar to previous years, highest CPAH values occurred in the Bodega Bay and Monterey areas where Cordell Bank and Monterey Submarine Canyon, respectively, provided the majority of the bocaccio catch.

Catch rates for bocaccio were higher at distant than at near locations for the San Francisco and Morro Bay areas (Table 33). Bocaccio are typically caught between 42-125 fathoms by CPFV anglers (Thomas and Bence, 1992), and thus as expected we found bocaccio CPAH to be much higher at deep

locations compared with shallow locations in all areas (Table 33).

Mean length of bocaccio showed a strong clinal trend, decreasing with decreasing latitude from the Bodega Bay area to the Morro Bay area, with a difference in means of 116 mm (4.6 in.) between Bodega Bay and Morro Bay (Table 34). Very few fish were caught in the Fort Bragg area. In addition, these fish were from shallow areas where younger and thus smaller fish are expected. Mean lengths from all port areas except Fort Bragg were all similar to respective mean lengths from 1987 to 1991 (Reilly et al. 1993).

Mean lengths for bocaccio in the San Francisco and Morro Bay areas were greater for distant locations as compared to near locations (Table 34), possibly indicating heavier fishing pressure in the latter areas. No significant difference in mean length was observed in the 607 bocaccio measured from near and distant locations in the Monterey area. All fish measured in the Fort Bragg area were from near and shallow locations and all fish measured in the Bodega Bay area were from distant and deep locations. When mean length at distant locations are compared for all port groups, there is a substantial difference between Bodega Bay area (Cordell Bank) fish and all other port areas to the south. This trend has continued since 1988 (Reilly et al. 1993).

Bocaccio are most frequently found in deep locations. Of those caught in both shallow and deep locations in Morro Bay, bocaccio measured from deep locations averaged 59 mm (2.3 in.) longer than those from shallow locations (Table 34).

Wyllie-Echeverria (1987) reported the lengths at 50% sexual maturity for bocaccio to be 430 mm (16.9 in.) for males and 440 mm (17.3 in.) for females. Length frequencies of bocaccio from Bodega Bay to Morro Bay indicate that most of the catch was greater than the lengths at 50% sexual maturity (Figure 6). Length frequencies of bocaccio from Monterey indicate a potentially strong year class at 325-350 mm (12.8-13.8 in.), however, this is not evident in other port areas.

Chilipepper, *Sebastes goodei*

Chilipepper were targeted by CPFVs in the Bodega Bay and Monterey areas and were observed caught incidentally in the Morro Bay area but not at all in the Fort Bragg or San Francisco areas (Table 35).

When catch-per-unit-effort rates for chilipepper were compared with previous years there was a continuing trend of declining CPAD and CPAH in the Monterey area, where the majority of observed fish were caught. CPAD and CPAH in Monterey ranged from 5.26 and 1.71, respectively, in 1987 down to 1.74 and 0.52, respectively, in 1992. This continuing decline is a cause for concern.

CPAH in the Monterey area was almost twice as high from near locations compared to distant locations (Table 36). All chilipepper in the Bodega Bay area were observed at distant locations, primarily Cordell Bank. All chilipepper observed in all ports and measured were taken at deep locations. Among deep locations CPAH was highest in the Monterey area (Table 36).

Similar to previous years, chilipepper were larger in 1992 in the Bodega Bay area compared with the Monterey and Morro Bay areas (Table 37) (Reilly et al. 1993). Those sampled in the Bodega Bay area had a mean length of 433 mm (17.0 in.), at least 28% larger than those from the Monterey and Morro Bay areas.

Only in Monterey were chilipepper sampled from both near and distant locations. We found fish caught at distant locations in the Monterey area to have a mean length 30 mm (1.2 in.) greater than that of fish caught in near locations (Table 37).

Different length distributions were evident for chilipepper sampled from the Bodega Bay and Monterey areas (Figure 7). Fifty percent of male and female chilipepper are sexually mature at 310 mm (12.2 in.) and 340 mm (13.4 in.), respectively (Wyllie-Echeverria 1987). Bodega Bay area samples showed a strong mode at 436-470 mm (17.1-18.5 in.) and indicated that most of the catch was probably sexually mature. Monterey samples, however, consisted of a high percentage of sexually immature fish with the peak occurring between 286-340 mm (11.2-13.4 in.).

Due to the migratory nature of this species and its vulnerability to midwater trawling and troll longlining (J. Mello, Dept. Fish and Game, Bodega Bay, pers. comm.), stocks fished seasonally by CPFVs may also sustain heavy commercial fishing pressure in the same or other areas. Thus, the observed declines in CPAH and the high proportion of immature fish caught in the Monterey area may be related to increased commercial fishing pressure and are a cause for concern. A long-term data series is needed to determine whether small size is due to a strong year-class entering the fishery or due to fishing pressure.

Olive Rockfish, *Sebastes serranoides*

With the exception of the Monterey area, CPAD and CPAH rates of olive rockfish in 1992 were similar to previous 1988-1991 data (Reilly et al. 1993), possibly indicating the population levels are stable. CPAH rates for olive rockfish were highest from the Monterey area (Table 38) and were almost twice that of any of the previous 5 years (Reilly et al. 1993). In all port areas, anglers realized higher catch rates at shallow and distant locations (Table 39).

No observable latitudinal trend was found in mean length of olive rockfish among all port areas (Table 40). Mean length varied by only 24 mm (0.9 in.) among all ports sampled. With the exception of Morro Bay, mean lengths of olive rockfish were consistently higher at distant locations compared to near locations (Table 40). Olive rockfish were captured primarily in shallow locations in all port areas with the exception of the Morro Bay area, where a significant number of fish were taken from both shallow and deep locations. Mean length of olive rockfish from Morro Bay was 73 mm (2.9 in.) greater at deep locations compared with shallow locations (Table 40).

Wyllie-Echeverria (1987) found that male and female olive rockfish are at 50% sexual maturity at 330 and 350 mm (12.9 to 13.8 in.), respectively; at 380 mm (15.0 in.) all males and most females are 100% sexually mature. Lea et al. (in press) found that at 380 mm (15.0 in.) olive rockfish are approximately 6 years old. A high proportion of sexually mature olive rockfish were found in catches from all port areas (Figure 8). With the exception of the Morro Bay area, all areas showed a distribution of length frequencies occurring approximately between 296-520 mm (11.7-20.5 in.) without a strong mode. Lea et al. (in press) indicated that olive rockfish in this length range were between 3-13 years old. Length frequency data of olive rockfish from the Morro Bay area displayed a bimodal distribution with significantly more fish less than 350 mm (13.8 in.).

Lingcod, *Ophiodon elongatus*

Lingcod are one of the largest and most desirable sport fishes within our study in northern and central California, but due to their non-schooling, territorial behavior, lingcod catch rates are typically low. CPAD and CPAH rates did not change drastically from our previously reported data from 1987-91 (Reilly et al. 1993, Table 41).

Lower CPAH rates for lingcod were found at near compared to distant locations in the San Francisco, Monterey, and Morro Bay areas (Table 42). Since lingcod can occur in relatively shallow water close to all port areas, as well as at deep and distant locations, these results may indicate that this species continues to experience heavy fishing pressure close to the ports in these areas. In the Bodega Bay area CPAH continued to be higher at locations nearer to port. CPAH was higher at shallow locations in all areas except San Francisco where CPAH was almost twice as high at deep locations (Table 42), and at Fort Bragg where no fish were observed caught at deep locations.

No port area has shown a consistent trend of increasing or decreasing mean length since the study began (Reilly et al. 1993). Mean length of lingcod was highest in the Bodega Bay area and lowest in the Morro Bay area (Table 43).

There were no differences in mean length observed for lingcod among ports at near and distant locations nor at deep and shallow locations (Table 43). However, mean lengths at deep locations exceeded those from shallow locations by 59 mm (2.3 in.) in Bodega Bay and by 80 mm (3.1 in.) in Monterey.

In the Monterey and Morro Bay areas, 34% and 46%, respectively, of all lingcod measured were within 50 mm above the minimum legal size (Figure 9). Having a significant proportion of the catch near minimum legal size several years in succession may be indicative of heavy fishing pressure. In spite of a five-fish bag limit and minimum legal size which have been in effect since 1981, sublegal-sized lingcod were often retained, particularly in the San Francisco area where 24% of all lingcod measured were less than minimum legal size (Figure 9).

Vermilion rockfish, *Sebastes miniatus*

Vermilion rockfish are highly desirable and sought by most rockfish anglers. As in recent years (Reilly et al. 1993), CPAH was higher in the Morro Bay area than in any other port (Table 44). Data collected since 1988 suggest catch rates have remained relatively stable within each port area. Fortunately, we have not found the CPAH of vermilion rockfish to decline during our 6 years of study.

No trend was found in catch rates between near and distant locations (Table 45). Vermilion rockfish were caught more frequently in shallow water locations in the Bodega Bay, San Francisco and

Monterey areas. In the Fort Bragg and Morro Bay areas, however, CPAH was higher at deep locations (Table 45).

Mean lengths of vermilion rockfish were higher at all port areas, except Bodega Bay, compared with the previous four to five years averages (Reilly et al. 1993). Mean length has increased every year at Morro Bay, from 318 mm in 1988 to 413 mm in 1992 (Reilly et al. 1993) (Table 46). Vermilion rockfish caught at distant locations were larger than those caught at near locations in all ports except Monterey. A trend of larger fish being caught at distant locations is a strong indication of heavier fishing pressure in areas close to port. There was no consistent trend found in size between shallow and deep locations.

The sport-catch of vermilion rockfish from Fort Bragg in 1992 consisted of predominately adult fish. Vermilion rockfish measured from the Fort Bragg area ranged from 403 to 620 mm which, based on length-age data from Lea et al. (in press), corresponds to between 6 and 20+ years (Figure 10). Length at 50% sexual maturity is reported to be 380 mm (15.0 in.) for males and 370 mm (14.6 in.) for females (Wyllie-Echeverria 1987).

Vermilion rockfish measured from the San Francisco, Monterey and Morro Bay areas spanned much wider length ranges. In Morro Bay, increased numbers of sexually-mature fish were observed in catches compared to previous years (Reilly et al. 1993).

Canary Rockfish, *Sebastes pinniger*

As in previous years (Reilly et al. 1993), mean CPAH for canary rockfish was greater in northern port areas. The Fort Bragg and Monterey areas had declines in canary rockfish CPAH from 1991(Reilly et al. 1993, Table 47). No trend among port areas was evident for catch rate relative to distance from port or depth (Table 48).

In 1992, mean length of canary rockfish in the Morro Bay area (Table 49) increased from the previous four years, decreased in the San Francisco and Monterey areas, and remained about the same in the Fort Bragg and Bodega Bay areas (Reilly et al. 1993).

A significant difference in mean length of canary rockfish between near and distant locations was apparent only in Bodega Bay, where fish from distant locations averaged 162 mm greater than those from near locations (Table 49). These larger fish were caught primarily at Cordell Bank. The opposite was true for canary rockfish from Monterey, which averaged 34 mm larger at near locations compared to distant locations. With the exception of Fort Bragg, canary rockfish from deep locations were larger than those taken from shallow locations, with the difference in Bodega Bay as high as 195 mm.

Wyllie-Echeverria (1987) and Adams (1992b) reported that at 50% sexual maturity female canary rockfish measure approximately 440 mm (17.7 in.) and males averaged 400 mm (15.7 in.). With the exception of Bodega Bay, the mean lengths of canary rockfish from all other ports showed catches were dominated by sexually immature fish (Figure 11). Canary rockfish samples from the Bodega Bay area represented a wider range of sizes, although most were immature. The fact that a high proportion of the canary rockfish CPFV catch is sexually immature is a cause for concern.

Greenspotted Rockfish, *Sebastes chlorostictus*

Greenspotted rockfish from the San Francisco area have shown a slow but consistent increasing trend in CPAH since 1988 (Reilly et al. 1993) (Table 50). No other catch trends were apparent from the other port areas.

Similar to previous years, CPAH was higher at distant locations compared with near locations (Table 51). Greenspotted rockfish were rarely caught in shallow locations at any of the five port areas in our study area which is not unusual as this fish typically occurs between 160 and 660 feet (Miller and Lea, 1972).

Greenspotted rockfish from the Bodega Bay area averaged from 39 to 43 mm larger in mean length than those from ports to the south (Table 52). Mean length has varied relatively little within a port area over our past six years of research (Reilly et al. 1993).

Mean lengths of greenspotted rockfish were greater at distant locations from the San Francisco, Monterey and Morro Bay areas (Table 52). Virtually all fish measured from Bodega Bay to Morro Bay were from deep locations.

Length frequency distributions for greenspotted rockfish overlapped considerably for all ports and did not differ appreciably from prior years (Reilly et al. 1993, Figure 12). According to Wyllie-Echeverria (1987), length of greenspotted rockfish at 50% sexual maturity is 270 mm for males and 280 mm for females. Therefore, it appears that most of those fish sampled from the Bodega Bay area are

sexually mature. Unlike the Bodega Bay area, the length frequency distribution of greenspotted rockfish from San Francisco includes a small number of younger sexually immature fish.

Length frequency distributions from the Monterey area reflected a healthy distribution of a wide range of lengths. The sample shows evidence of a wide size range of sexually mature adults indicating a relatively stable population.

Morro Bay area samples were similar to Monterey's but with a slightly more limited size range.

Starry Rockfish, *Sebastes constellatus*

CPAH of starry rockfish increased in the San Francisco area in 1992 compared with 1990-91 data and decreased by 50% in the Monterey area during the same time period (Table 53) (Reilly et al. 1993). CPAH at deep locations was higher than at shallow locations, especially at San Francisco (Table 54).

Mean lengths of starry rockfish in 1992 decreased in the Fort Bragg, Bodega Bay and San Francisco areas in comparison to our 1987-1991 data (Reilly et al. 1993). Mean lengths increased slightly in the Monterey area since 1988 and were within the range previously observed in the Morro Bay area. Starry rockfish caught at distant locations in the San Francisco, Monterey and Morro Bay areas were larger than those taken from near locations (Table 55). Mean lengths of those caught at deep locations in the Bodega Bay, San Francisco and Morro Bay areas were also larger than those from shallow locations, with the difference as high as 75 mm in the Bodega Bay area.

Wyllie-Echeverria (1987) reported length at 50% sexual maturity to be 270 mm for females and 300 mm for males. Starry rockfish sampled from San Francisco to the Morro Bay area showed fairly wide length-frequency distributions with sampled length ranges corresponding to a high proportion of sexually mature adults (Figure 13). In Monterey the mode shifted from 300 mm in 1991 to 350 mm in 1992. Morro Bay lengths have remained stable since 1988.

Copper Rockfish, *Sebastes caurinus*

Copper rockfish are widely distributed in depth range and latitude and are considered a highly desirable species. Catch rates for this species were low in all port areas, which is typical for non-schooling species. In comparison to 1991 data (Reilly et al. 1993), CPAD and CPAH for copper rockfish decreased in the Fort Bragg and Bodega Bay areas and increased in the San Francisco, Monterey and Morro Bay areas. Highest catch rates were found at San Francisco, Monterey, and Morro Bay (Table 56). No trend in CPAH relative to distance from port or depth was evident for any port area in 1992 (Table 57).

The few fish measured from the Bodega Bay area averaged 39-43 mm (1.5-1.7 in.) longer compared to those from areas to the south (Table 58). Mean lengths of copper rockfish taken from distant and deep locations were greater compared to those taken at near and shallow locations.

Wyllie-Echeverria (1987) reported length at 50% sexual maturity for copper rockfish to be 320 mm for males and 340 mm for females. Lea et al. (in press) reported fish of these lengths to be approximately 6 years and older. High percentages of sexually mature copper rockfish were observed at Fort Bragg, San Francisco, Monterey, and Morro Bay ports (Figure 14).

Gopher Rockfish, *Sebastes carnatus*

Gopher rockfish were caught in all ports but 85% were observed caught in the Morro Bay area. Mean CPAH in 1992 was similar to previous years (Reilly et al. 1993), with Morro Bay the highest of all ports (Table 59). We found similar CPAH values between near and distant location catches in the Morro Bay area in 1992 (Table 60) compared to previous years' (Reilly et al. 1993) values where CPAH was twice as high for distant compared to near locations. As expected (Miller and Lea, 1972), gopher rockfish were taken exclusively at shallow locations, with the exception of two fish recorded at a deep location in the Morro Bay area.

Mean lengths of gopher rockfish from Monterey and Morro Bay were considerably higher at distant compared to near locations (Table 61). Maximum length for observed gopher rockfish in 1992 was 345 mm, ranking them 19th in mean length (rosy rockfish was 20th) among the 20 most frequently observed species from Fort Bragg to Morro Bay (Table 12). No trend in mean length was apparent among the different port areas in 1992 nor for our entire 6-year study period (Reilly et al. 1993).

Wyllie-Echeverria (1987) reported 170 mm to be the length at 50% sexual maturity for gopher rockfish. They are one of the smallest CPFV-caught species. Though sample sizes were small from San Francisco and Monterey, gopher rockfish measured at the three southernmost ports were well above this size (Figure 15). Morro Bay anglers retained 99.6% of all gopher rockfish caught.

Black Rockfish, *Sebastes melanops*

Black rockfish are most abundant along shallow nearshore areas of northern California, with the Morro Bay area representing the southern end of its range (Miller and Lea 1972). As might be expected, catch rates in 1992 reflected this decrease in abundance with latitude (Table 62). This species is one of the primary target species of sport anglers along the north coast and is an important commercial species primarily in the Eureka area of California. Black rockfish have always been an important component of the San Francisco area sport catch but CPAH rates have declined annually during the last 6 years of this study. In previous years, 77% of all black rockfish observed taken were from the San Francisco area (Reilly et al. 1993); that value decreased to 28% in 1992. Ranking abundance dropped from 13 during 1988-1991 to 15 in 1992, reflecting decreases in San Francisco and Morro Bay area catches.

Black rockfish were more frequently caught at distant rather than near locations in the Fort Bragg, San Francisco and Morro Bay areas, but the opposite was true in the Bodega Bay area (Table 63). Almost no black rockfish were observed caught at deep locations, indicating a primary distribution shallower than 40 fm.

Mean lengths remained about the same in the Morro Bay area and increased slightly in the Fort Bragg area compared with 1991 (Table 64) (Reilly et al. 1993). A decline in mean length has occurred in the San Francisco area since 1988 (Reilly et al. 1993) and continued during 1992. This, coupled with a steady decline in CPAH, is cause for concern.

Length at 50% sexual maturity was reported to be 350 mm for males and 390 mm for females by Wyllie-Echeverria (1987). Based upon Wyllie-Echeverria's study, a high percentage of black rockfish caught at all ports was sexually immature. The length frequency of black rockfish sampled from San Francisco was very narrow, and almost entirely less than the size at 50% sexual maturity (Figure 16). Since 1988 when we began collecting CPFV catch information in the San Francisco area, an obvious and discouraging trend has become evident. In 1988, the length frequency distribution was multi-modal and broad, with a substantial proportion of fish greater than the lengths at 50% sexual maturity. By 1989, the smaller (recruitment) mode had shifted to the right and the relative proportion of fish exceeding 400 mm had decreased. By 1990, larger fish were absent from samples and catches contained a high proportion of sexually immature fish. In 1992 the observed catch continued to show a high proportion of sexually immature fish and a virtual absence of sexually mature adults.

The disappearance of larger fish from San Francisco catches indicates an exceedingly high exploitation rate. Because black rockfish primarily have a shallow distribution, as evidenced by the shallow/deep location catch data (Table 63), little protection of spawning adults is available in deep natural refuges. Black rockfish were not among the most frequently observed species in the commercial hook-and-line fishery in the San Francisco area but are taken for the live-fish fishery (B. Ota, Dept. Fish and Game, Menlo Park, pers. comm.). In California they are only an important component of the commercial fishery in the Eureka area; thus, they probably have experienced a relatively high level of exploitation by sport anglers, both CPFV and skiff, in this area.

No black rockfish were sampled from the Monterey area in 1992. Samples from the Morro Bay area indicate few fish are surpassing or even reaching the 50% sexual maturity size range. Concerns expressed for the San Francisco area stock also apply to the Monterey and Morro Bay port areas.

Greenstriped Rockfish, *Sebastes elongatus*

Due to their relatively small size, greenstriped rockfish are not considered to be a highly desirable rockfish, much like the rosy rockfish. Except for the Monterey area, catch rates were relatively low (Table 65). The Monterey area yielded 74% of all greenstriped rockfish measured in the study. Greenstriped rockfish continued to be caught with greater frequency at distant and deep locations (Table 66).

No trend in mean length was evident for greenstriped rockfish among port areas in 1992, nor during the past 6 years of sampling (Reilly et al. 1993). In the Monterey area, the mean length of greenstriped rockfish has varied by only 21 mm over this period. Although there is no directed effort for greenstriped rockfish, they are caught incidentally by anglers fishing for other deep-water species. Mean length at distant locations was greater than at near locations, particularly in the Morro Bay area (Table 67).

The reported length at 50% sexual maturity of greenstriped rockfish is 230 mm for both sexes (Wyllie-Echeverria 1987). Length-frequency distributions of greenstriped rockfish from both the Monterey and Morro Bay areas indicate a high proportion of sexually mature adults but low num-

bers of new recruits to the fished population (Figure 17). The latter is not cause for concern, however, because new recruits are probably not well represented due to their small size and increased likelihood of being released before they could be measured. For example, in the Morro Bay area more than 10% of all greenstriped rockfish caught were either released or used as bait (Table 19).

Brown Rockfish, *Sebastes auriculatus*

Brown rockfish CPAH showed a dramatic decline in the Bodega Bay area in 1992 compared with the previous year (from 0.59 to 0.04) (Reilly et al. 1993). No trends were apparent for other port areas (Table 68). Catch rates were higher at near locations in the Bodega Bay area, higher at distant locations in the Morro Bay area and fairly similar in the San Francisco area (Table 69). This species generally is more abundant and widespread in shallower water (Adams 1992a, Miller and Lea 1972), and essentially all brown rockfish were caught at shallow locations (Table 69). Brown rockfish experience heavy commercial fishing pressure in the San Francisco and Bodega Bay areas; in the former area it was the most frequently observed species in commercial hook-and-line samples in 1992 (B. Ota, CDFG, Menlo Park, pers. comm.).

Mean length of brown rockfish from the San Francisco area has been remarkably similar from 1988 to 1992 (Reilly et al. 1993), varying only 6 mm. Brown rockfish mean lengths from all other port areas were highly variable with no apparent trend. In 1992 mean length varied by only 16 mm among the southern four port areas (Table 70). Brown rockfish were not sampled from Fort Bragg catches. Mean lengths of brown rockfish were higher at distant than at near locations in the Bodega Bay, San Francisco and Morro Bay areas. The difference was highest in the Bodega Bay area (64 mm), which may indicate the effect of heavier fishing pressure closer to port. This difference was not apparent from our previous data (Reilly et al. 1993).

Wyllie-Echeverria (1987) reported the size at 50% sexual maturity for brown rockfish as 310 mm for both sexes and Adams (1992a) reported 100% sexual maturity as ≥381 mm. Sufficient numbers of fish at and above the length range corresponding to 50% as well as 100% sexual maturity at the ports of Bodega Bay, San Francisco and Morro Bay indicated stocks in good condition (Figure 18).

Yelloweye rockfish, *Sebastes ruberrimus*

Yelloweye rockfish are highly desirable "red rockfish", and are one of the largest of the 19 most frequently caught species in this study. They are caught throughout our sampling area (Figure 1) although at low frequencies due to their deep, non-schooling distribution. CPAH rates were fairly similar in all port areas in 1992 but reflected declines in the Fort Bragg, Bodega Bay and San Francisco areas over our previous 5-year study (Table 71) (Reilly et al. 1993). These declines from 1990-91 ranged from 50% in the San Francisco area to 70% in the Fort Bragg area and are a cause for concern. Catch-per-angler hour rates were found to be higher in distant and deep locations for most port areas, the former indicating the effects of heavier fishing pressure closer to port (Table 72).

Mean length of yelloweye rockfish varied considerably among all areas in 1992 (Table 73) and among all areas during the past 6 years of study (Reilly et al. 1993). Mean length of yelloweye rockfish from the San Francisco area decreased in 1992 compared to our previous 5-year study, and increased in the Monterey and Morro Bay areas over the same time period.

Although sample sizes were small in all areas, mean lengths of yelloweye rockfish from distant locations were greater than those from near locations for the San Francisco and Monterey areas, an indication of relatively heavy local fishing pressure. The reverse was true for Fort Bragg and Morro Bay (Table 73). In the San Francisco area, all deep locations, where larger yelloweye rockfish usually occur, are also distant locations, thus biasing this comparison. Sample sizes were too small to compare mean total lengths between shallow and deep locations (Table 73).

Lea et al. (in press) noted the smallest observed sexually mature female yelloweye rockfish in central California was 408 mm, while Wyllie-Echeverria (1987) reported length at 50% sexual maturity for both sexes of yelloweye rockfish to be 400 mm. This species is slow-growing, with a 400-mm fish being approximately 8 to 9 years old (Lea et al. in press). Although the sample sizes were small (n=23), as many as 74% of yelloweye rockfish from the Fort Bragg area were sexually immature (Figure 19). Conversely, fish measured from the Bodega Bay area were at or above the length at 50% sexual maturity. Yelloweye rockfish from the San Francisco area

showed fairly consistent length frequency distributions during the five years sampled (Reilly et al. 1993), with higher proportions of juveniles compared to adults. Monterey and Morro Bay yelloweye rockfish samples were also small but consisted of fairly wide length-range distributions.

Yelloweye rockfish stocks in both the Fort Bragg and San Francisco areas also are of concern due to the presence of a high proportion of sexually immature fish in the sampled catch. As with canary rockfish, it is possible that enough spawning adults exist in deeper water to provide periodic recruitment to shallower areas. However, this may not provide the large adults desired by most anglers if fishing pressure continues at present levels.

China Rockfish, *Sebastes nebulosus*

Similar to previous years, CPAH for China rockfish was relatively low in all port areas (Table 74) (Reilly et al. 1993). CPAH in the San Francisco area declined to 0.02 fish compared with a range of 0.06 to 0.09 fish from 1988 to 1991, and may be a cause for concern. The catch rates in the Fort Bragg and Morro Bay port areas were higher at distant rather than near locations, and in all port areas China rockfish were almost entirely caught at shallow locations (Table 75); only two fish were observed caught from deep locations.

Mean lengths of China rockfish showed no consistent trend among port areas in 1992 nor during the last 6 years of study. Mean lengths have changed relatively little within a particular area (Table 76) (Reilly et al. 1993). One exception was a decrease in mean length of 25 mm in the San Francisco area from 1990 to 1992. Mean lengths were larger from near locations in San Francisco and Morro Bay compared to distant locations (Table 76), while the reverse was true in the Fort Bragg and Monterey areas.

Wyllie-Echeverria (1987) reported 270 mm as the length at 50% sexual maturity for both sexes of China rockfish, which corresponds to an age of approximately 6 years (Lea et al. in press). Sample sizes were all fairly small for China rockfish measured from Fort Bragg, San Francisco and Morro Bay but all samples showed the majority of the individuals at or beyond 50% sexual maturity (Figure 20). China rockfish measured from the Morro Bay area exhibited the narrowest length range distribution of the three port areas in spite of a larger sample size, ranging from 240-335 mm. This distribution is very similar to the observed lengths found in 1989 and 1991. The relatively narrow length and corresponding age range in this area could signal a problem, but the majority of fish were at or above the length at 50% sexual maturity.

Estimated Total Catch and Effort

Trends in average values of CPAD and CPAH, mean lengths of species by port area, and percentage of immature fish in sampled catches are better parameters for assessing the health of our CPFV sport fisheries than trends in total estimated catch. We feel strongly, however, that making a good faith effort at adjusting total reported catch using logbook compliance rates is necessary to accurately estimate total CPFV catches of rockfish and lingcod.

Logbook Data

According to CPFV logbook data, 6,506 single day trips targeting rockfish and lingcod took place north of Point Conception, discounting multi-day trips and dive trips (Table 77). The Northern California Group includes ports in Del Norte and Humboldt counties, areas not included in our onboard sampling program during 1992.

In general, effort (number of single day trips), total number of fish kept, number of anglers, and number of hours fished increased with decreasing latitude, as observed in past years. Morro Bay area ports accounted for one third of all logged trips. Number of trips for the Northern California and San Francisco areas have been very consistent over the past 3 years. There was an increase in the number of logged trips in the Fort Bragg, Monterey, and Bodega Bay areas over the previous year, ranging from 6 to 39%.

Total catch for all ports in 1992 was higher than the previous year (1,356,067 fish, Table 75 in Reilly et al. 1993; Table 77 this report) and higher than the previous 5-year average catch of 1,385,700 fish. Northern California was the only port group with a lower catch in 1992 compared to 1991. When catches were compared with the previous 5 years by port area, there continued to be no consistent trends. In 1992, rockfishes comprised between 93% and 98% of the total number of fish caught by port area, and lingcod comprised between 1 and 4% of the reported catch (Table 77).

The overall CPAD of 12.7 compared closely with our observed value of 12.6 fish per angler day. All ports had higher CPAD values in 1992 than the previous year except Northern California ports; San Francisco had a significantly higher CPAD value

than the previous 3 years. CPAD was highest in Bodega Bay, followed by Monterey and San Francisco, with Northern California area ports having the lowest value. Bodega Bay area CPAH was also highest followed by Fort Bragg, Monterey and San Francisco. The Bodega Bay area has had the highest CPAD and CPAH each year since 1988. Bodega Bay area's CPAD of 14.0 represents an effective CPAD of 13.7 rockfish, (97% of the observed catch were rockfish) compared to the daily bag limit of 15 rockfish.

Trends in CPAD since 1987 were compared for unadjusted logbook data and data collected aboard CPFVs by port group (Table 78). Data collected aboard CPFVs are assumed to be representative of all trips; however, only 3-4% of all trips are sampled each year. Based on this comparison, Morro Bay and Bodega Bay captains appear to consistently overestimate angler catches. San Francisco captains also tended to overestimate catches, although in 1992, they significantly underestimated catches. Monterey and Morro Bay captains have been recording catches more accurately (unadjusted and observed values are similar) beginning in 1989 and 1990, respectively. San Francisco CPFV operators recorded catches more accurately prior to 1992. Overall, in 1992 observed average catches per angler were higher in San Francisco and Morro Bay than in any of the previous 4 years.

Adjusted Logbook Data

Compliance rates for logbook submission continued to be less than 100%. The compliance rate in 1992 was 63%, averaged for all port areas, compared to values for previous years ranging from 92% to 63% from 1988 to 1991 (Reilly et al. 1993). Rates varied between port group as follows: 73%, Bodega Bay; 72%, San Francisco; 67%, Morro Bay; 55%, Monterey; and 52%, Fort Bragg. For all port groups except Ft. Bragg compliance rates represent the average for all ports in that group. This was the first year that the sample size from Ft. Bragg was sufficient (i.e. > 20 trips) to estimate compliance.

Calculations of compliance rate are based on comparisons between data from sampled trips and logbook data submitted by CPFV skippers. Due to potential errors in the logbook data, actual compliance could be slightly higher than the calculated value. Higher compliance reduces the amount by which catch is adjusted, so the total estimated catch would be slightly lower than a value obtained using a lower compliance rate.

Skipper compliance with filling out logs was determined using only vessels sampled onboard, and is limited by the fact that all vessels are not sampled in direct proportion to their fishing effort. Thus there may be some biases in calculated compliance rates and the adjusted data. For example, if sampled vessels had compliance rates far lower than non-sampled vessels, adjusted catch estimates would overestimate true catch. The 55% value for the Monterey area represents the average for the ports of Santa Cruz (73%) and Monterey (40%), (the only area with a vast discrepancy between port values). The low Monterey value reflects a number of sampled trips on one vessel for which there was no logbook data in 1992.

In the three most southern port areas, estimated logbook compliance generally decreased in 1992 compared with the previous 4-5 years. The 1987-91 average for the Monterey area was 75%, while the 1988-91 averages for the San Francisco and Morro Bay areas were 86% and 87%, respectively. Compliance for the Bodega Bay area in 1992 was very close to the average from the previous 4 years (73%).

Compliance rate for San Francisco area vessels was determined independently in 1992 by aerial survey of vessels (Sport Fish Restoration Federal Aid, Annual Performance Report, Study 2, Job 3, 1992). This was done to assess the impacts of any reporting bias due to the presence of the technician. For this area, in 1992, the compliance rate for log submission by vessels fishing for rockfish or lingcod was 77% from aerial survey data. This higher value is close to the 72% calculated from our own observations, suggesting the presence of a technician does not increase the likelihood of log submission.

Adjusted values for logbook data, based on logbook compliance estimates and onboard sampling data, are provided for the number of trips, number of fish, number of anglers, and CPAD in Table 79. The most apparent difference in the adjusted logbook data is the significant increase in the total catch by port area and for all areas combined, from unadjusted values. The estimated total catch (as 'No. fish kept') increased by 33%, from 1,540,771 to 2,295,802 fish. The number of angler days increased by 31%.

CPAD increased from the unadjusted value of 12.7 to 13.1. CPAD increased in the Bodega and San Francisco areas, while in the Fort Bragg and Morro Bay areas CPAD decreased.

Overall, the dramatic increase in adjusted catch compared with the unadjusted catch for 1992 can be explained by an observed CPAD higher than that derived from logbook data combined with relatively low compliance rates for some port areas. In addition, in previous years Fort Bragg data were not adjusted due to small sample size. It is important to keep in mind that the logbook catch information is based on estimates of kept fish, and that the overall retention ratio was 92.6% (Table 18). Thus, the estimated adjusted total catch, including released fish, may have been closer to 2,479,268 fish.

Values for adjusted CPAD were higher than previous years for all port areas except Monterey. The Bodega Bay and San Francisco CPAD values climbed to 15.0 and 14.9, respectively, representing effective rockfish catches of 14.6 and 13.9 fish based on the percent composition of rockfish reported in their catches. The adjusted CPAD for San Francisco represents a 23% increase over that observed in 1991.

There was a dramatic increase (47%) in the adjusted total estimated catch for 1992, compared with the previous year (Reilly et al. 1993). This is most likely due to a combination of increased angler effort (estimated 27% increase) and increased angler success (16% increase in average CPAD). Upwardly adjusting the Fort Bragg reported catch for the first time also increased the total adjusted catch.

Adjusted total catch was partitioned by species and port using the percent composition values obtained from observed catch data (Tables 80 to 84). Fort Bragg data were not compared because previous catches were not adjusted. When total catches by species were compared with previous years (Reilly et al. 1993) several trends were apparent. Estimated blue rockfish catch increased 150% in the San Francisco and Morro Bay areas compared with averages from 1988 to 1991 estimated adjusted catches. Increases were also observed in estimated catch for yellowtail rockfish in the San Francisco (89%) and Monterey (33%) areas, and for widow rockfish in the Bodega Bay and Morro Bay areas compared with previous years. Lingcod catches increased in the Monterey area, but decreased for the fourth consecutive year in the San Francisco area. Estimated chilipepper catches declined substantially in the Monterey area from 1987 to 1990 (Reilly et al. 1993) but for the past 3 years have varied between 81,000 and 85,000 fish. In the Bodega Bay area, the estimated chilipepper catch increased in 1992 compared with 1991 but was still only 45% of the 1988-89 average estimated catch.

Summary

Angler success as measured by mean CPAH of kept fish on sampled trips increased in all port areas except Fort Bragg and Monterey in 1992 compared with previous years data (Reilly et al. 1993). CPAH was highest in the San Francisco area and lowest in the Monterey area in 1992. Monterey area CPAH declined by 15% while the San Francisco area showed a 53% increase in CPAH over the previous 5-year unweighted average (Reilly et al. 1993). The average daily catch (CPAD) (for kept fish and all fish) for all port areas combined was also higher in 1992 than in any previous year of the study (Reilly et al. 1993).

Approximately 93% of all fish observed caught were kept by CPFV anglers, slightly lower than the 95% rate observed between 1987-1991 (Reilly et al. 1993). The Fort Bragg area again had the lowest percentage of kept fish, although the San Francisco area showed a 4.5% decline in retention compared with the previous 4-year average of 95.5%. The Bodega Bay and Morro Bay areas showed slight increases in retention over the previous 4-year average.

Of 230 sampled trips from the five port areas, 37% fished exclusively at shallow locations, 37% fished exclusively at deep locations, and 25% fished at either exclusively mixed locations or a combination of shallow, mixed, and deep locations. The percentage of trips to deep locations in 1992 was only slightly higher than the previous 4 years combined (35%) and does not appear to indicate a significant increase in the relative amount of fishing effort at depths exceeding 40 fm. The Monterey and Bodega Bay areas again had the highest percentages of deep-location trips, and the Fort Bragg and San Francisco areas had the highest frequency of shallow-location trips. Mean CPAH was higher at shallow locations compared with deep locations in all port areas except Fort Bragg. In the Monterey area, over four times more fish were caught in deep locations, largely due to a higher frequency of trips to those areas. The relatively high catch rates of schooling species such as chilipepper and yellowtail rockfish in these deep locations may also be a factor.

We found higher catch rates in deep compared to shallow locations for bocaccio, chilipepper and

yelloweye rockfish in all port areas, and for lingcod in deep locations in the San Francisco, Monterey and Morro Bay areas. Results for the rockfish species were not unexpected due to the deeper distribution of adults. Mean lengths were greater in deep locations for bocaccio (all ports), vermilion rockfish (San Francisco and Monterey), and starry rockfish (Bodega Bay, San Francisco and Morro Bay).

Gopher, kelp, grass, and black-and-yellow rockfishes and kelp greenling are species indicative of shallow water fishing [less than 120 ft(20 fm)]. Relative abundance of these species in San Francisco decreased by 83% from 1988 to 1992 (2.4% to 0.4 % of the catch). Kelp and grass rockfishes were not observed in the sampled catch in 1992.

Of the 151 discrete locations identified in 1992, 89 were near locations (defined as having the location center $\leq$ 10 naut. mi. from any sampled port) and 62 were distant locations (defined as having the location center > 10 naut. mi. from all sampled ports). The Bodega Bay and San Francisco area ports had the highest percentages (>50) of distant locations, while the Fort Bragg and Morro Bay areas had relatively low percentages (<15) of distant locations.

For all port areas combined, 62% of the 230 sampled trips fished at near locations, 29% fished in distant locations, and 9% fished in mixed locations, differing very little from 1988-1991 data (Reilly et al. 1993). The frequency of trips to distant locations declined slightly from the previous 5 years (33%)(Reilly et al. 1993), an encouraging sign.

CPAH rates generally were higher in distant locations in the Fort Bragg and Monterey areas. CPAH rates were higher in distant locations for yelloweye and vermilion rockfishes, bocaccio (San Francisco and Morro Bay) and chilipepper, possibly indicating greater abundance due to heavier fishing pressure closer to the port areas. Mean lengths for bocaccio, chilipepper, and vermilion and starry rockfishes were also higher at distant locations compared to near locations in most port areas. Virtually all of the study area's coastline is now reachable by many CPFVs during a one-day trip. As fishing success declines in locations traditionally fished close to port, CPFVs generally will seek fishing locations farther from port which have sustained less fishing pressure and thus provide a higher frequency of larger fish.

We observed 60 species of fish during the study of which 32 were rockfishes comprising 93% of the catch. Seventeen of the 20 most frequently observed species were rockfishes. The 10 most frequently observed species overall were, in order of abundance, blue rockfish, yellowtail rockfish, widow rockfish, rosy rockfish, bocaccio, chilipepper, olive rockfish, lingcod, vermilion rockfish, and canary rockfish. The observed catch composition by port area was comprised primarily of rockfishes, ranging from 92% of the total catch in the Monterey area to 97% of the total catch in the Bodega Bay area. Of the 32 species of rockfishes observed in the CPFV catch in 1992, 22 are commonly harvested in commercial fisheries.

The 20 most frequently observed species caught in 1992 included most of those just previously discussed. New to the top twenty in 1992 were Pacific mackerel and Pacific sanddab which ranked 15 and 19, respectively. Gone from the top twenty was Pacific hake which previously ranked 10 in the combined 1988-1991 observed catch from all port areas (Reilly et al. 1993); only one Pacific hake was caught in 1992, in the San Francisco area.

Chilipepper ranked 19 in the 1960 CPFV catch from the California-Oregon border to Point Arguello (Miller and Gotshall 1965), increased to rank 2 during the 1988 to 1991 period (Reilly et al. 1993), and fell to rank 6 in 1992. Though they have recently slightly declined in CPAH, chilipepper are still a major component of the CPFV fishery (mainly in Bodega Bay and Monterey) and continue to reflect the shift in effort to deeper fishing sites within the last 30 years. Chilipepper are targeted in Bodega Bay and Monterey, caught occasionally in Morro Bay, and are seen infrequently in the Fort Bragg and San Francisco area catches. Increased commercial fishing pressure on chilipepper, combined with a high proportion of immature fish in the Monterey area sampled catches, are causes for concern. However, due to this specie's tendency to be influenced by episodic strong year-classes, a longer time series of sampling data is needed to properly assess the effects of continued fishing pressure.

Blue, yellowtail, widow and olive rockfishes and lingcod accounted for 61% of the total observed catch. In addition, rosy and canary rockfishes were important components of the catch in most port areas, while chilipepper were locally important in the Monterey and Bodega Bay areas. These eight species comprised 78.4% of the total observed catch.

Black rockfish continue to be a species of great concern to us based on 1992 data. This species has

declined in the overall CPFV catch from rank 1 in 1966 to rank 13 in 1992. In the San Francisco area, CPFV catch rates have declined annually during our last 5 years of study. This, as well as the continual decline in mean length of the sampled catch since 1988 indicates a problem with this resource. These factors coupled with the disappearance of larger fish in the sampled population most likely indicates an excessive exploitation rate. In 1992 the sampled catch continued to show a high proportion of sexually immature fish and a virtual absence of sexually mature adults. No black rockfish were sampled from the Monterey area in 1992. Samples from the Morro Bay area indicate few fish are surpassing or even reaching the 50% sexual maturity size range. Concerns expressed for the San Francisco area stock also apply to the Monterey and Morro Bay port areas. Sampled catches of blue and canary rockfishes (all ports) and widow rockfishes (Fort Bragg, San Francisco and Morro Bay) continued to be composed of high proportions of sexually immature fish.

In general, lingcod CPAH has declined over the last 5 years. Monterey was the only port showing increased CPAH during 1992. Catches from San Francisco declined 3-fold from 1988. This trend was aggravated by a relatively high retention rate of sublegal fish in this area.

If mean size of species relative to distance from port is indicative of heavy fishing pressure, then vermilion, brown, and yelloweye rockfishes may be experiencing such. CPAH was also higher at distant and/or deep locations for most port areas for these species. An additional indicator of extensive fishing pressure for yelloweye rockfish was the second consecutive year of a low numbers of sexually mature fish in Fort Bragg area catches. However, a relatively high proportion of trips to shallow locations may be a significant factor in this observation.

On the positive side, we have seen several encouraging trends in the CPFV fishery, such as good recruitment of olive rockfish, significant numbers of sexually mature adult vermilion rockfish, and relatively healthy stocks of copper rockfish in the San Francisco, Monterey and Morro Bay areas. Few of the species important to the CPFV fishery have experienced steady declines in mean CPAH or mean length in a particular port area during our 5 or 6 years of sampling. Many of the sampled rockfish populations continue to show a wide range of lengths (and presumably corresponding ages). A long-term data series continues to be of critical importance to distinguish factors caused by fishing pressure from those due to variable year class strength or oceanographic influences on growth and natural mortality.

The dramatic increase (47%) in the adjusted total estimated catch for 1992, compared with the previous year, is most likely due to a combination of increased angler effort (estimated 27% increase) and increased angler success (16% increase in average CPAD). An increased sample size in the Fort Bragg area allowed us to adjust upward for the first time the reported catch there; this also increased the total adjusted catch.

Skipper compliance with filling out logs was determined using the vessels sampled, and is limited by the fact that all vessels are not sampled in direct proportion to their fishing effort. Thus there may be some biases in calculated compliance rates and the adjusted data. For example, if sampled vessels had compliance rates far lower than non-sampled vessels, adjusted catch estimates would overestimate true catch.

Trends in average values of CPAD and CPAH, mean lengths of species by port area, and percentage of immature fish in sampled catches are better parameters for assessing the health of our CPFV sport fisheries than trends in total estimated catch. We feel strongly, however, that making a good faith effort at adjusting total reported catch using logbook compliance rates is necessary to accurately estimate total CPFV catches of rockfish and lingcod.

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We are grateful to the owners, operators, deckhands, and dockside staff of the CPFV industry for their continued participation and cooperation.

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enthusiasm was endless.

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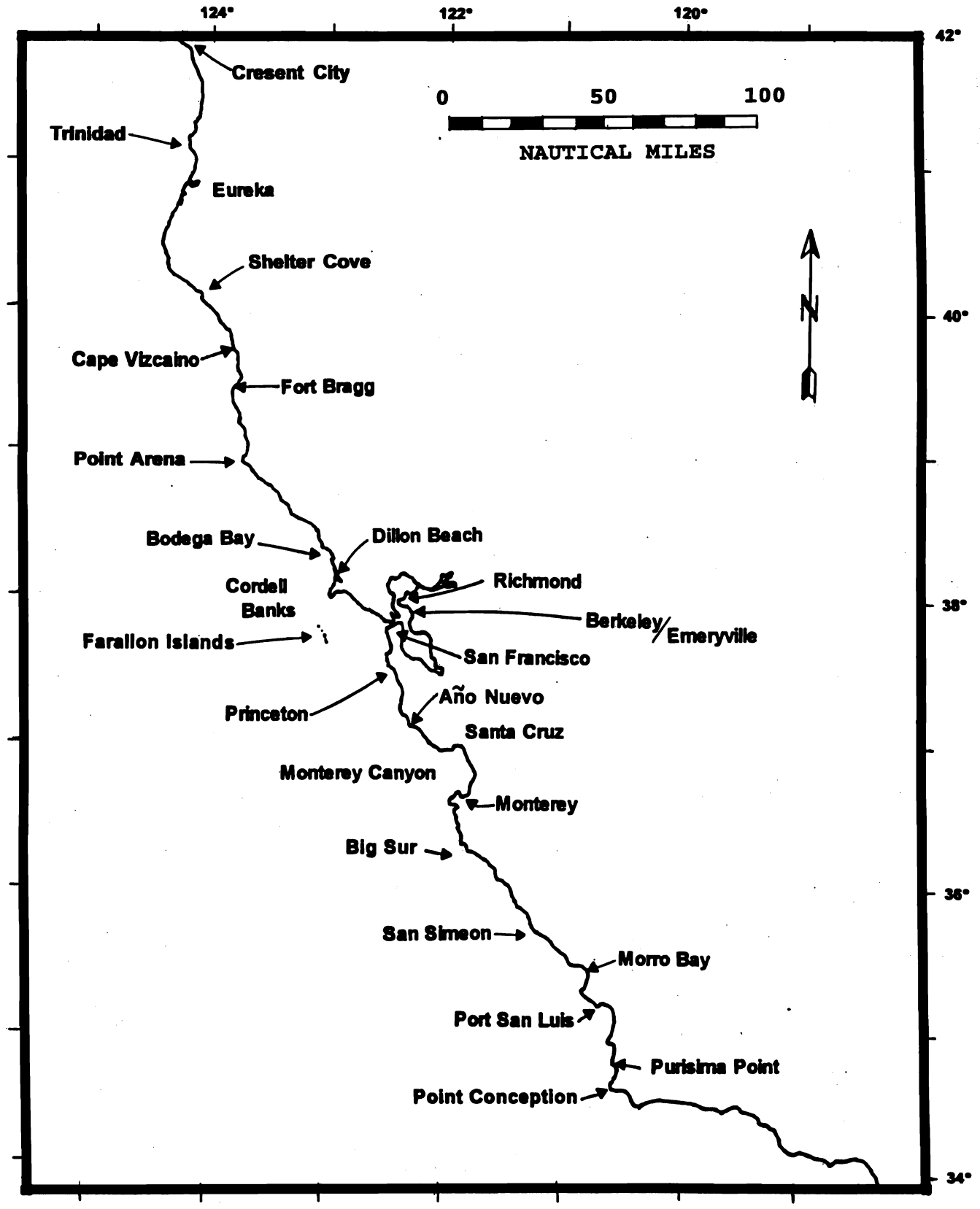

FIGURE 1. CPFV sampling area in central and northern California.

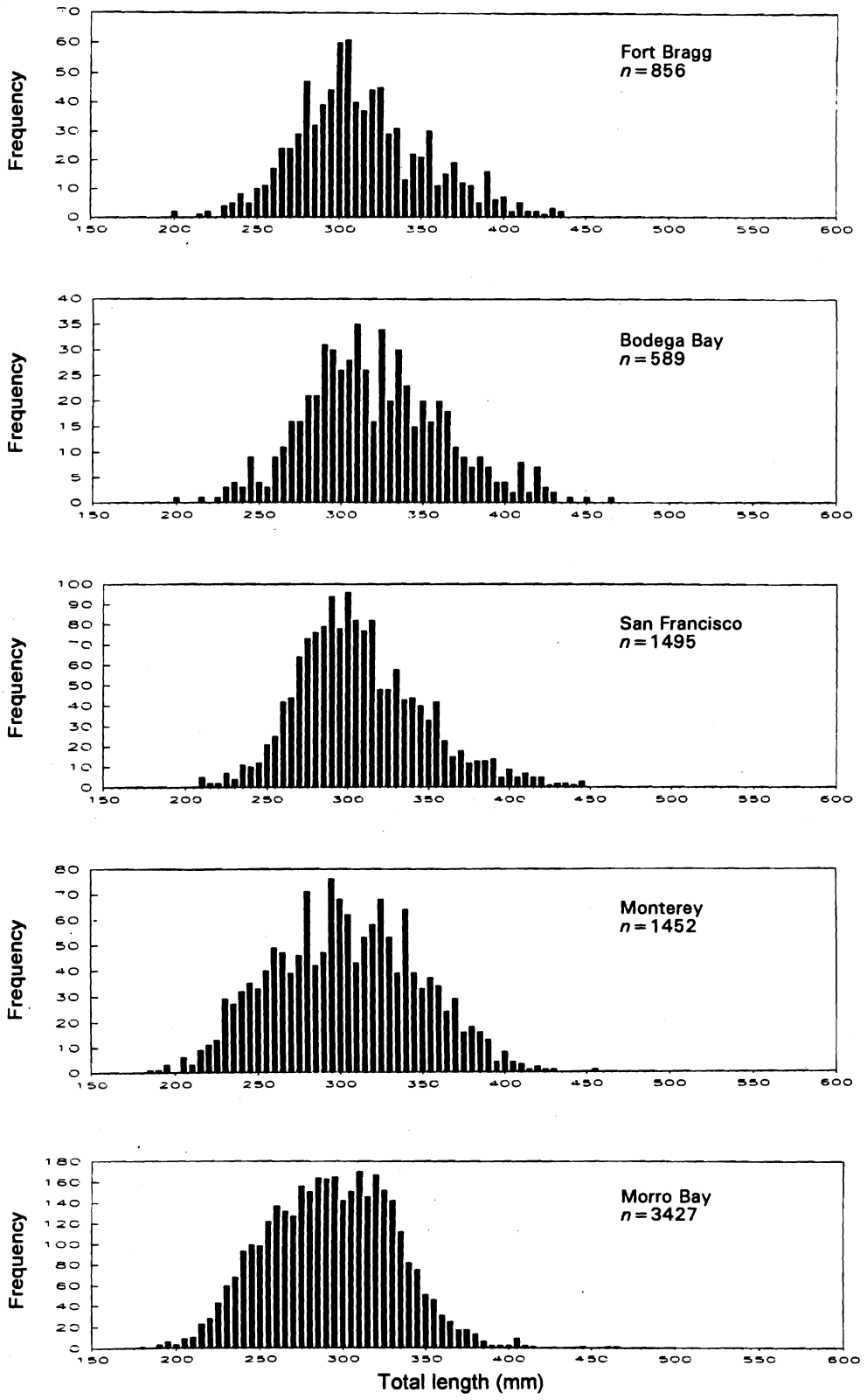

FIGURE 2. Length-frequency distribution of blue rockfish by port area, 1992.

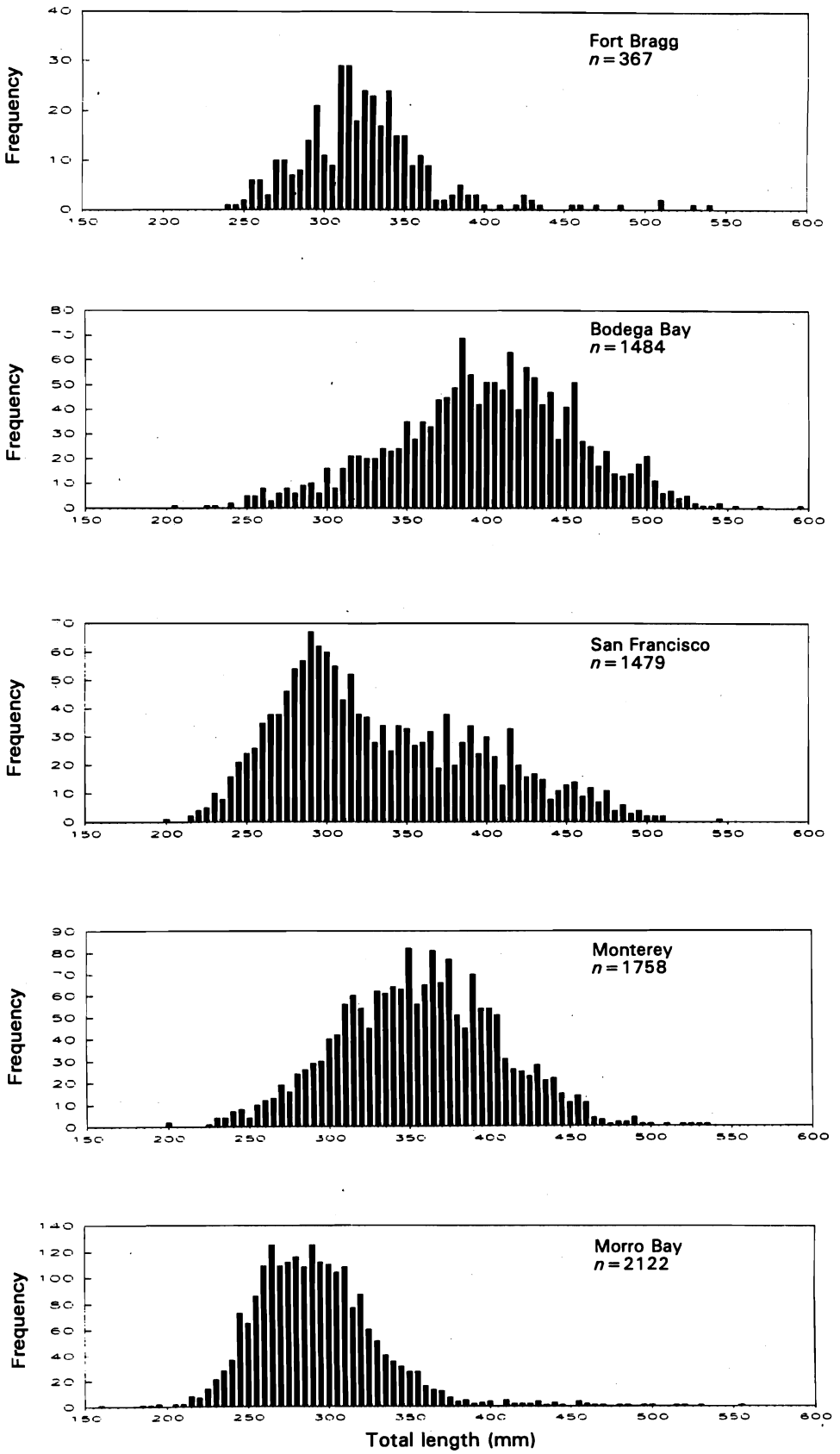

FIGURE 3. Length-frequency distribution of yellowtail rockfish by port area, 1992.

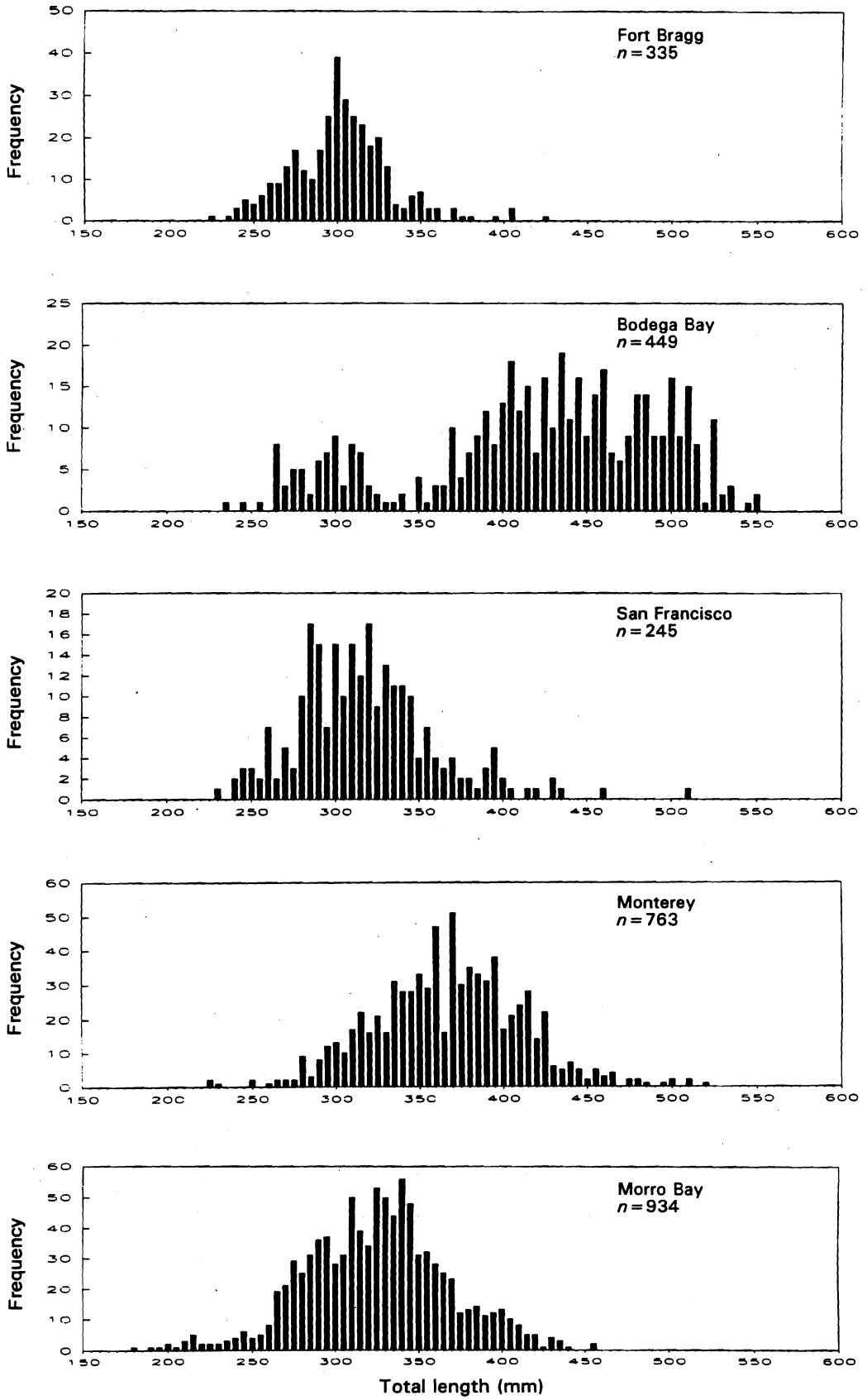

FIGURE 4. Length-frequency distribution of widow rockfish by port area, 1992.

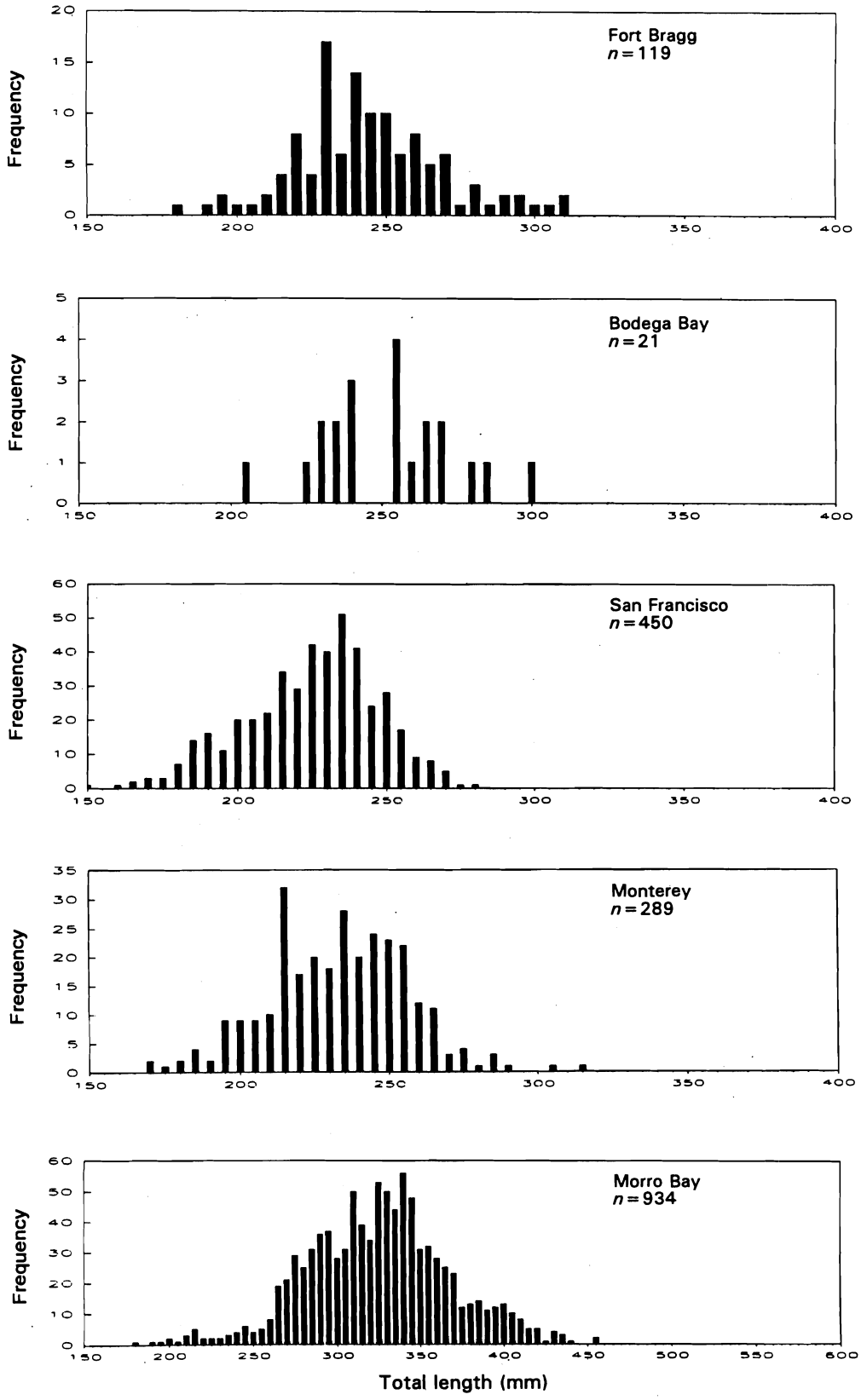

FIGURE 5. Length-frequency distribution of rosy rockfish by port area, 1992.

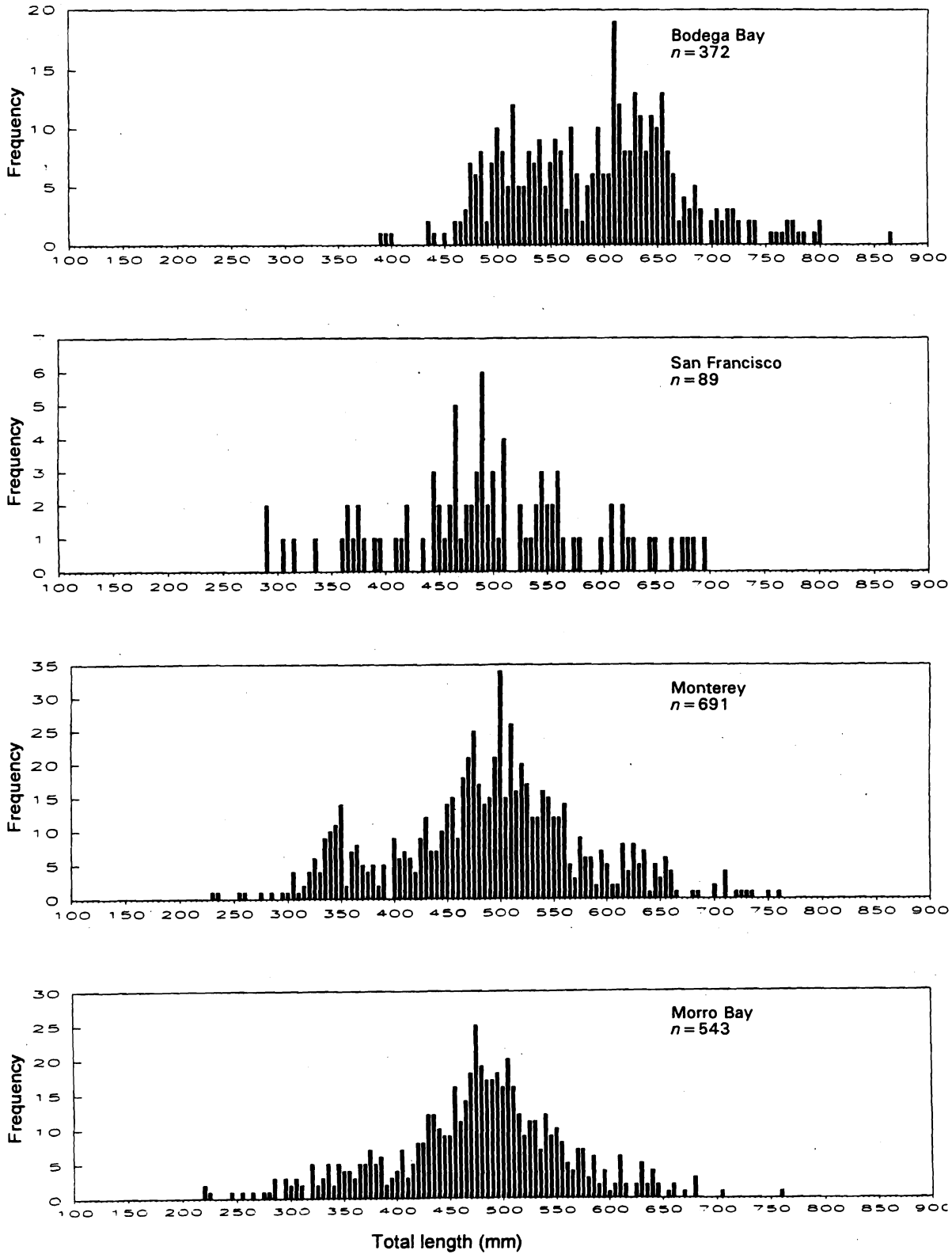

FIGURE 6. Length-frequency distribution of bocaccio by port area, 1992.

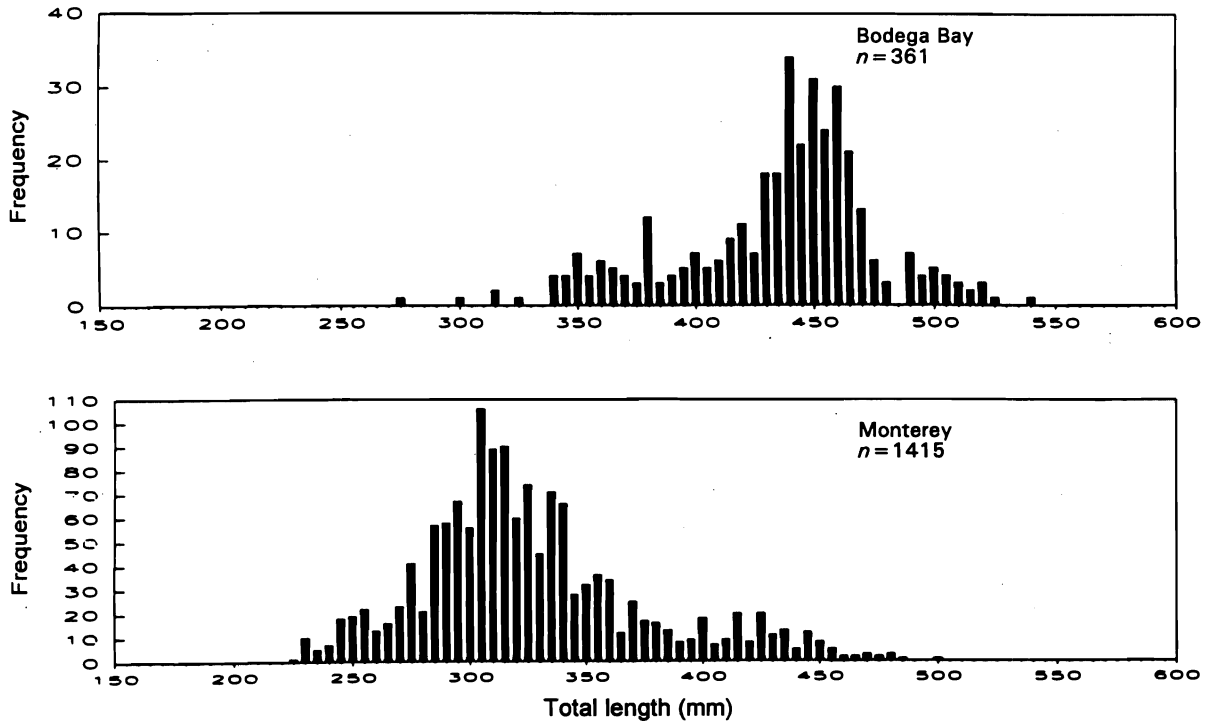

FIGURE 7. Length-frequency distribution of chilipepper by port area, 1992.

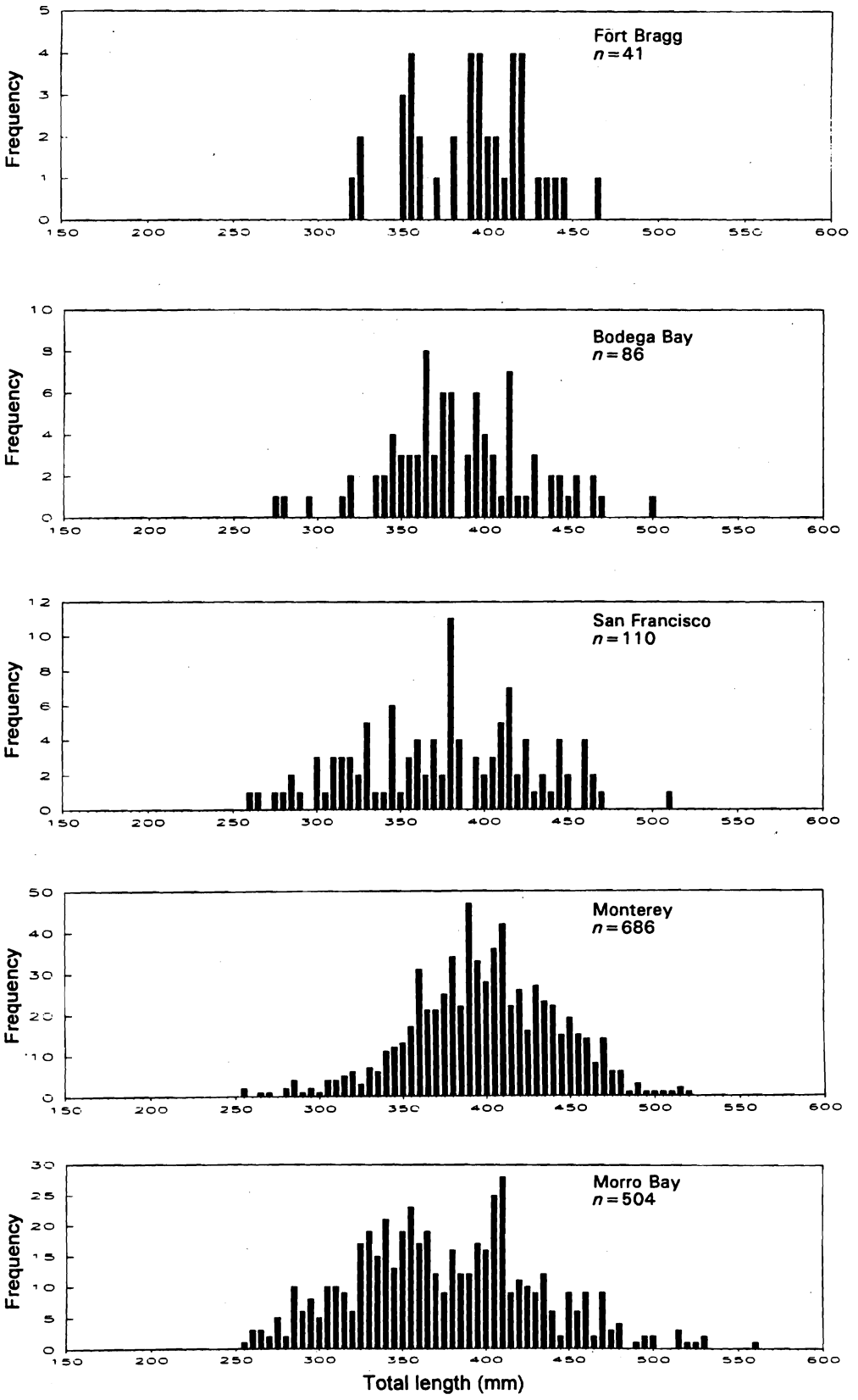

FIGURE 8. Length-frequency distribution of olive rockfish by port area, 1992.

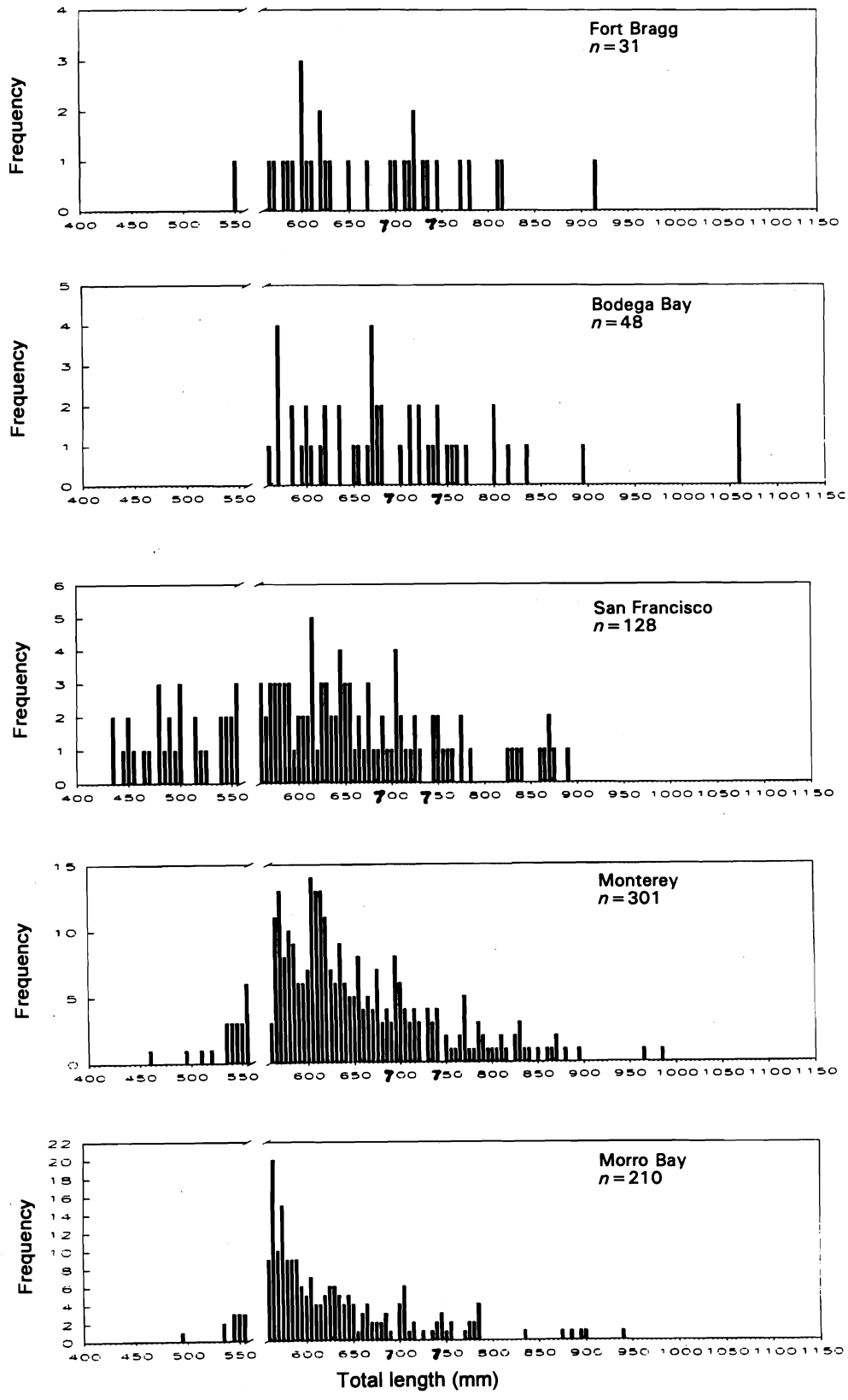

FIGURE 9. Length-frequency distribution of lingcod by port area, 1992.

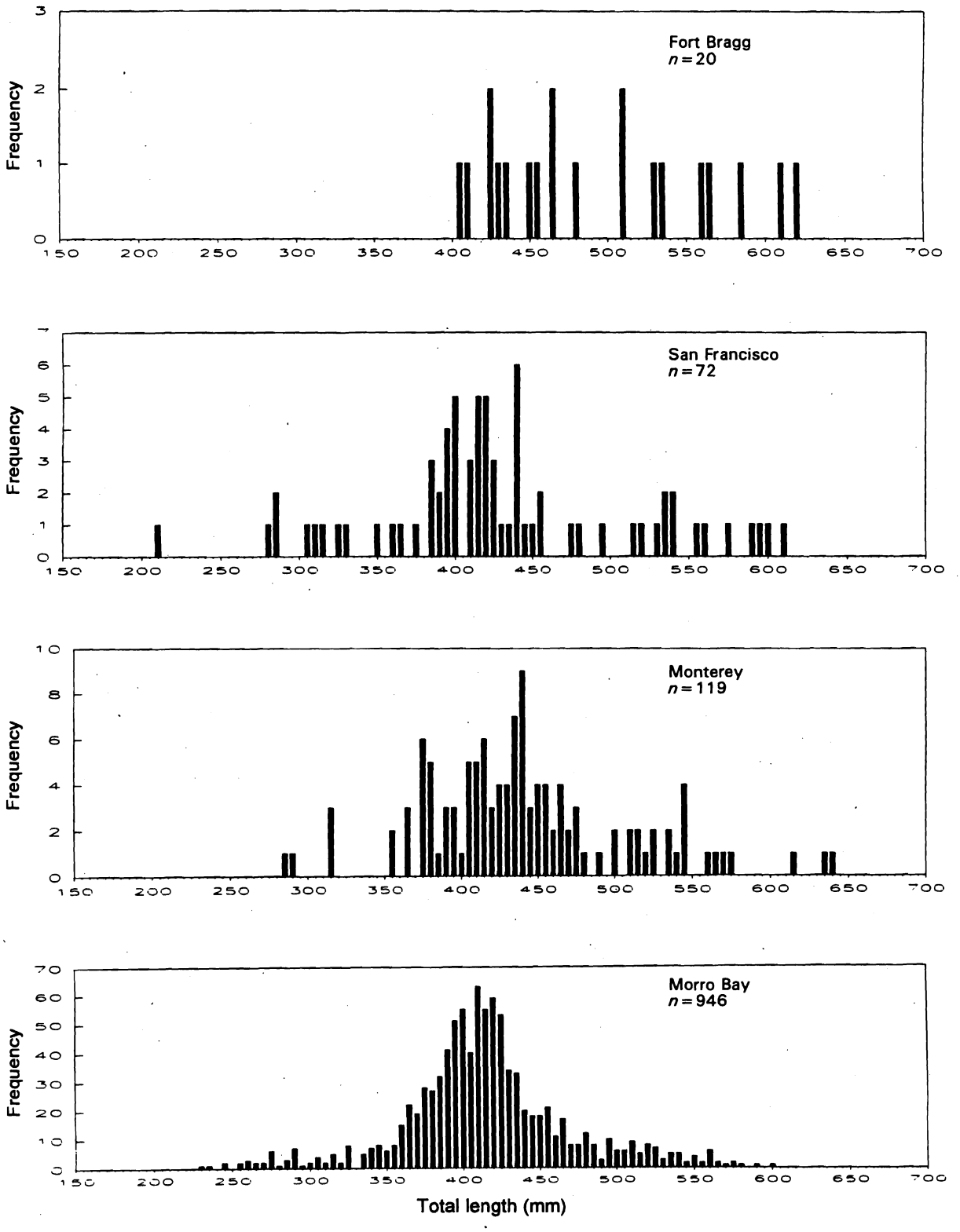

FIGURE 10. Length-frequency distribution of vermilion rockfish by port area, 1992.

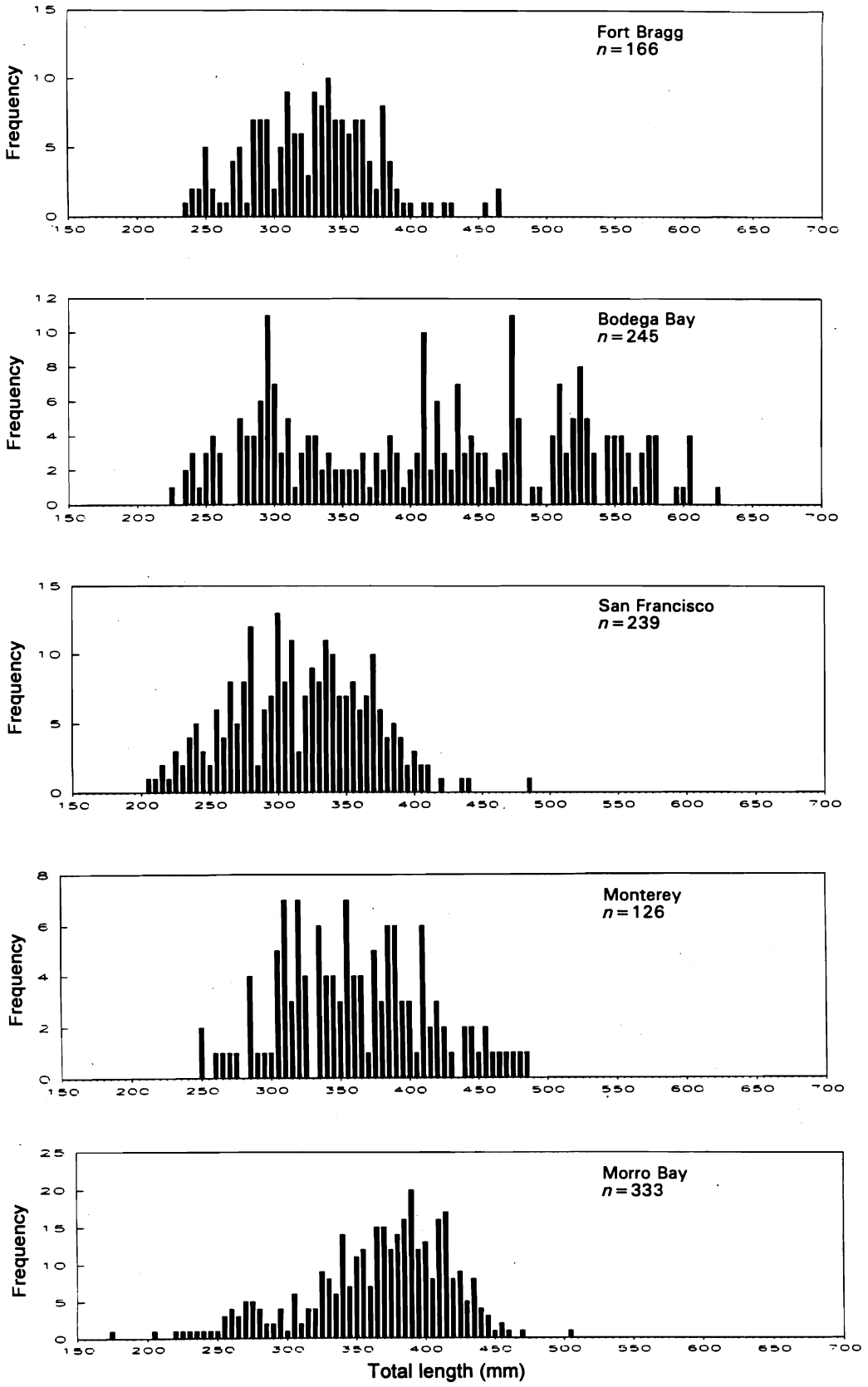

FIGURE 11. Length-frequency distribution of canary rockfish by port area, 1992.

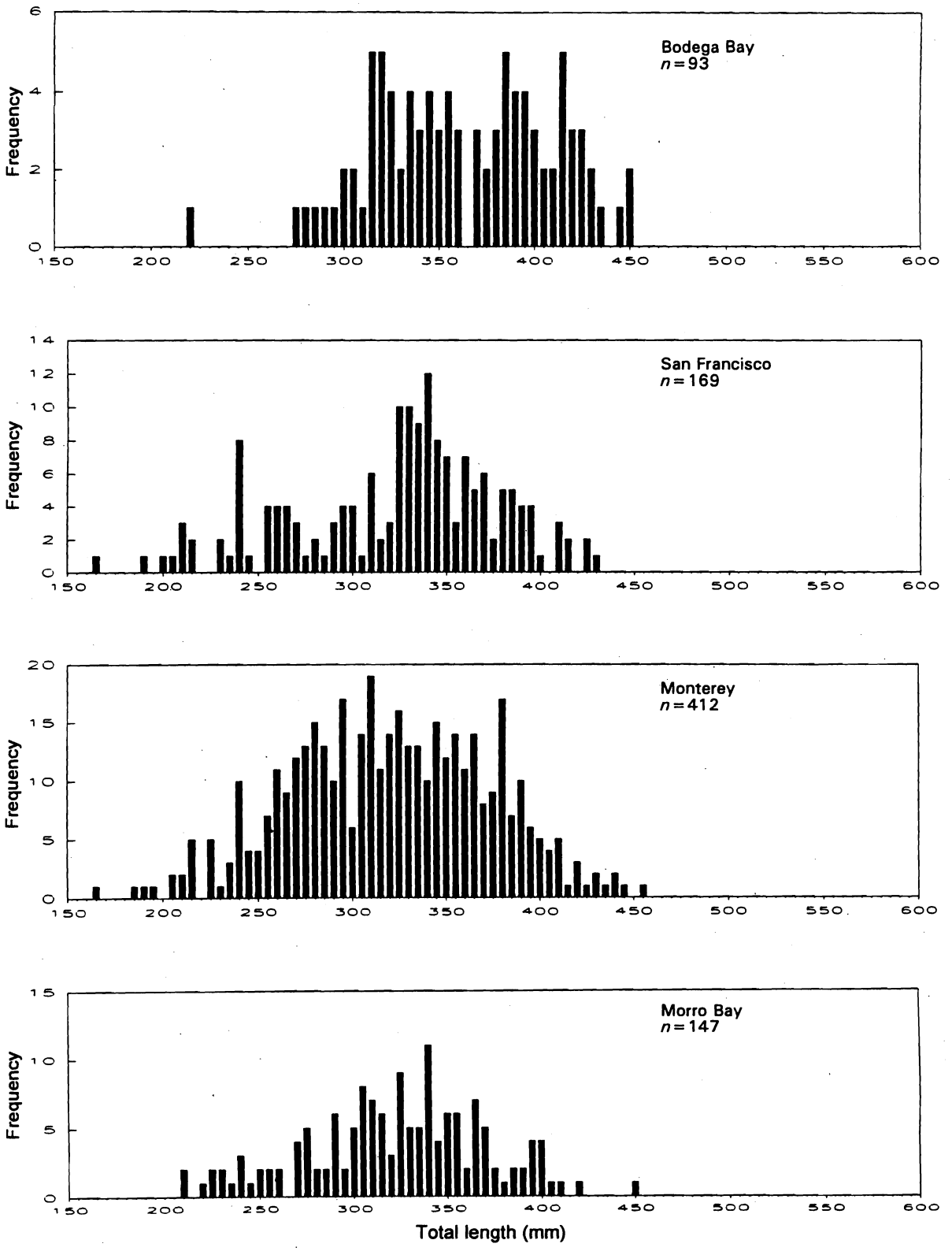

FIGURE 12. Length-frequency distribution of greenspotted rockfish by port area, 1992.

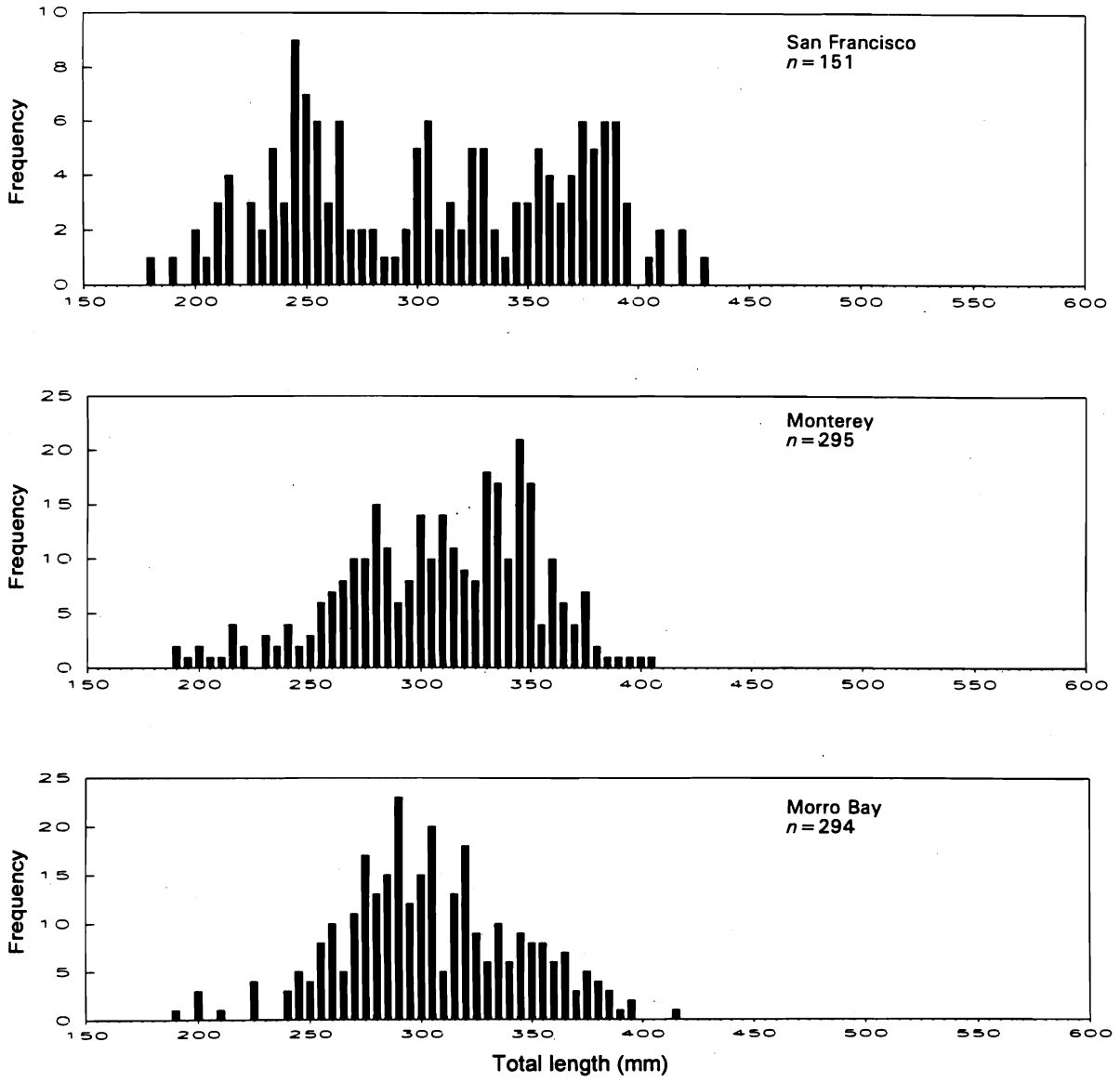

FIGURE 13. Length-frequency distribution of starry rockfish by port area, 1992.

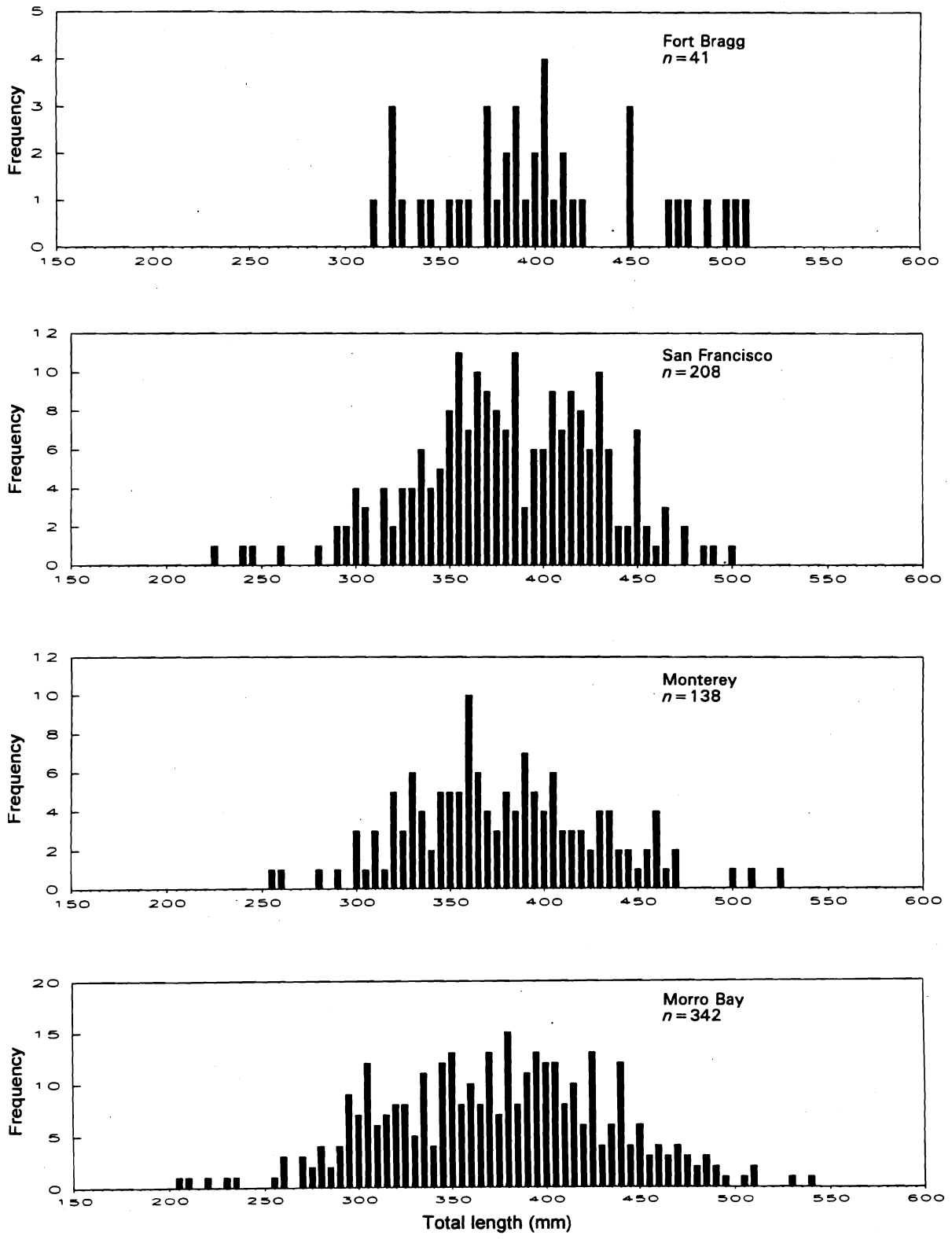

FIGURE 14. Length-frequency distribution of copper rockfish by port area, 1992.

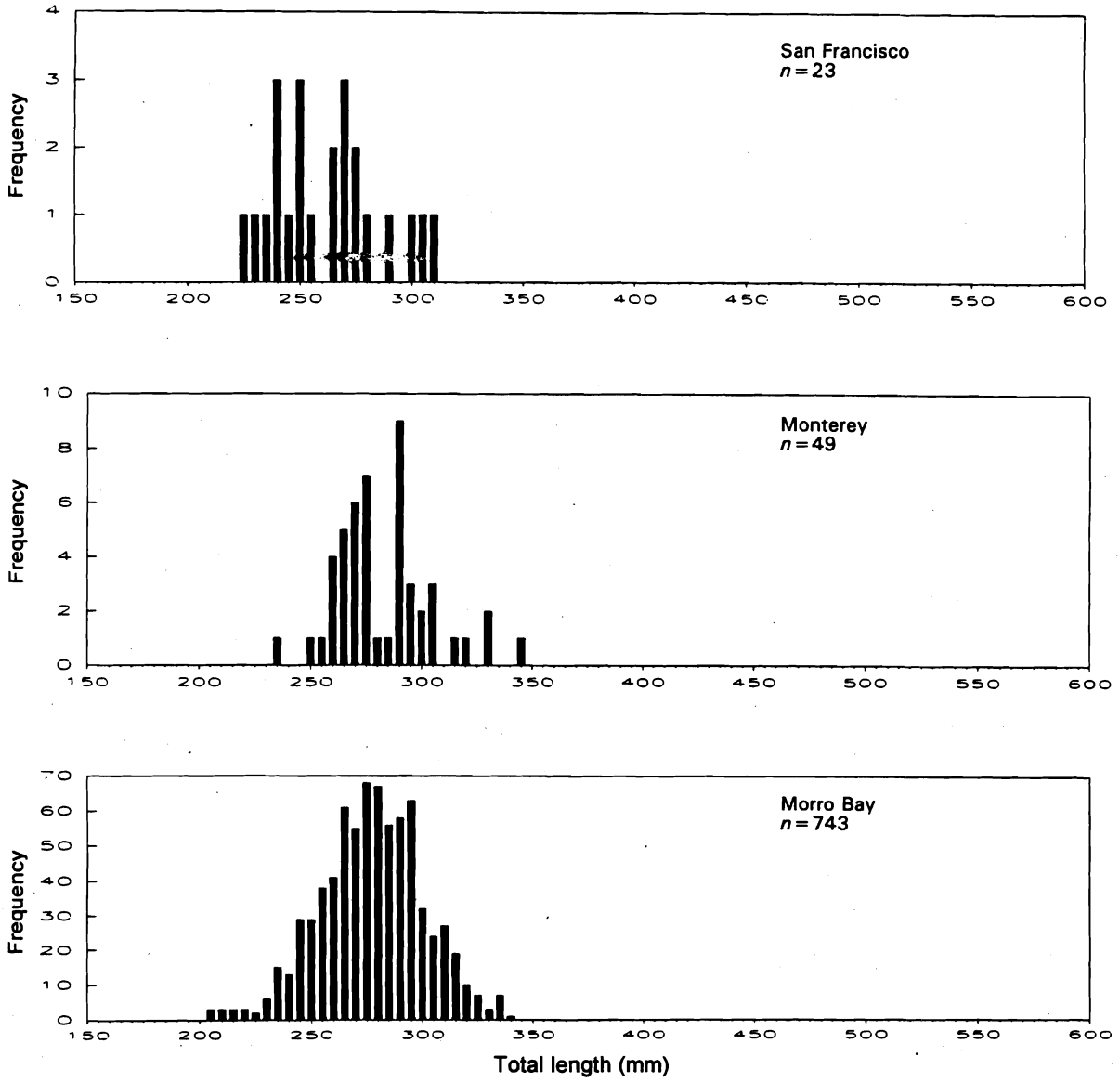

FIGURE 15. Length-frequency distribution of gopher rockfish by port area, 1992.

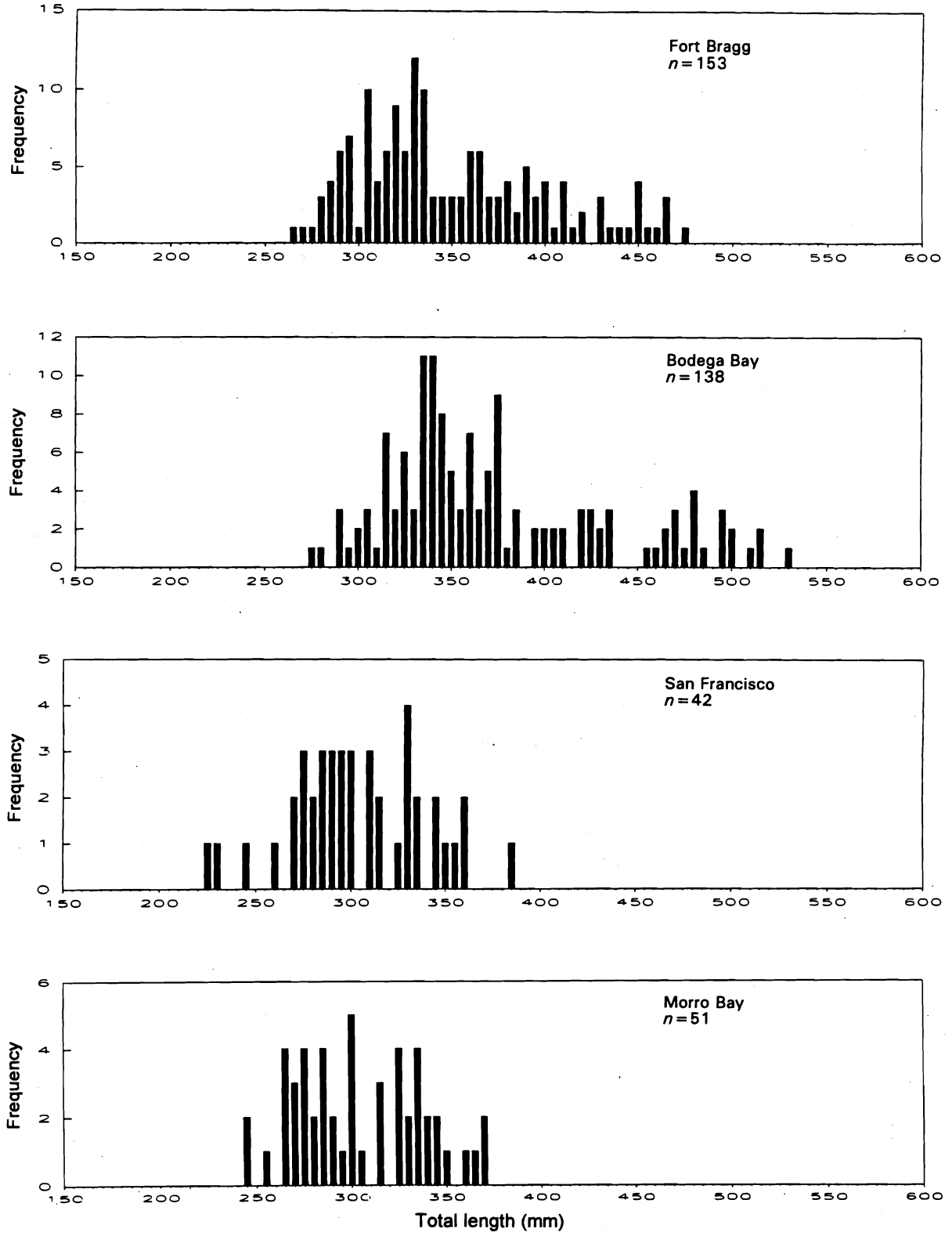

FIGURE 16. Length-frequency distribution of black rockfish by port area, 1992.

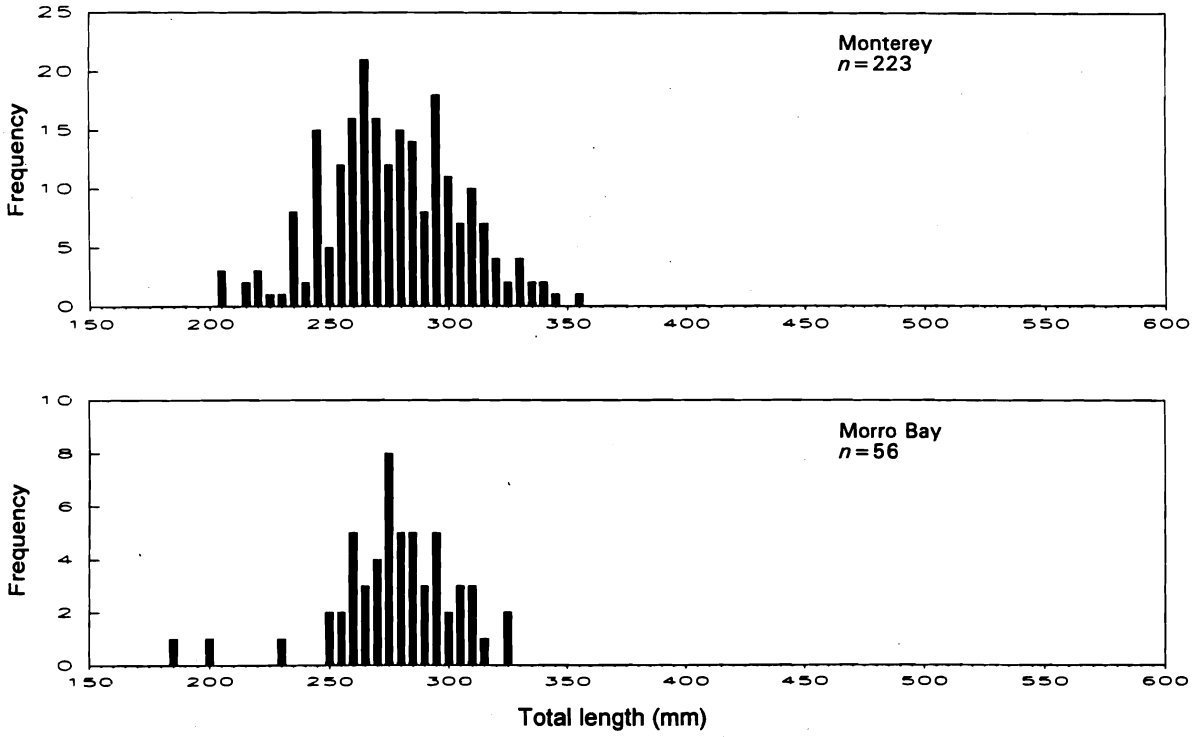

FIGURE 17. Length-frequency distribution of greenstriped rockfish by port area, 1992.

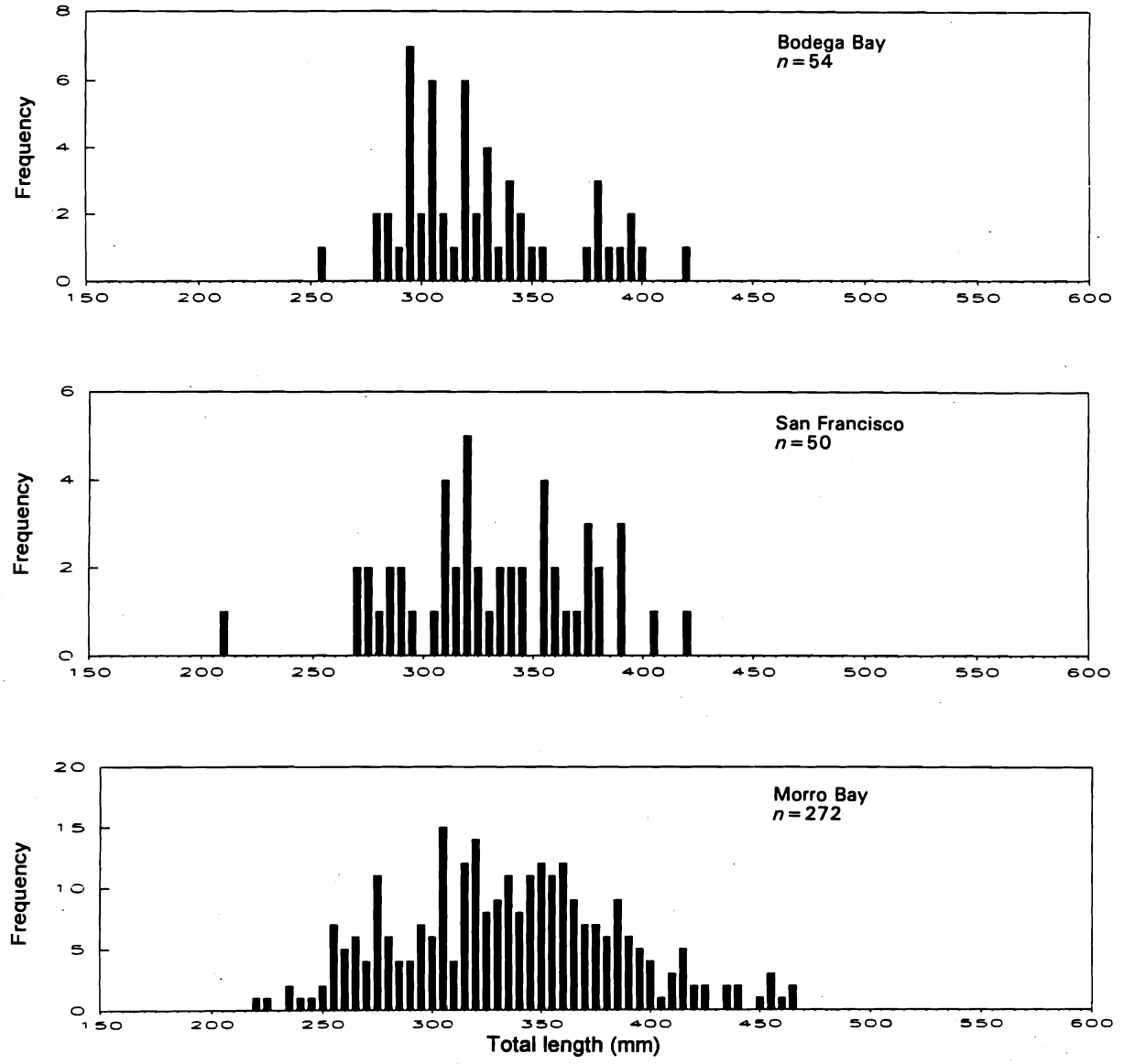

FIGURE 18. Length-frequency distribution of brown rockfish by port area, 1992.

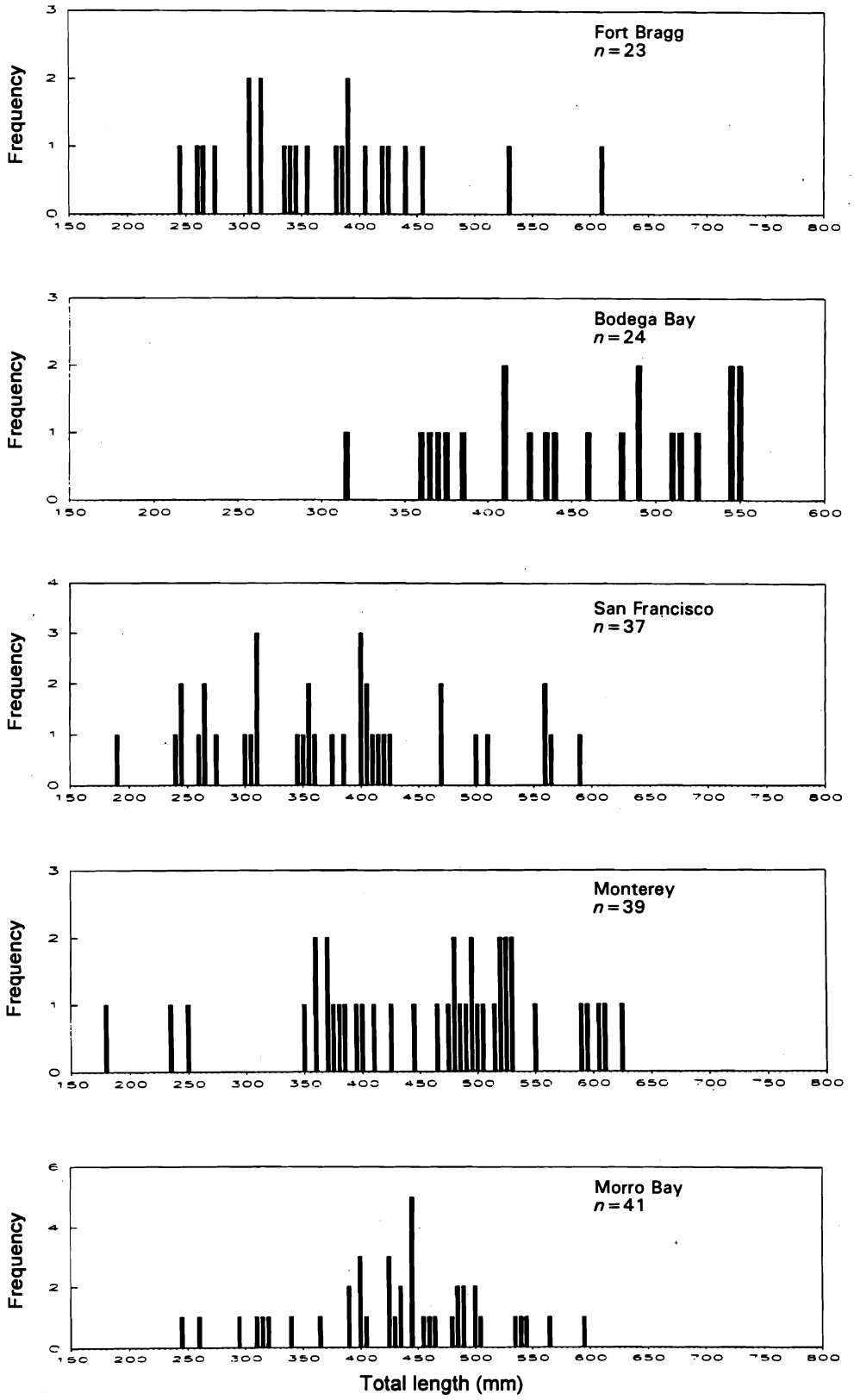

FIGURE 19. Length-frequency distribution of yelloweye rockfish by port area, 1992.

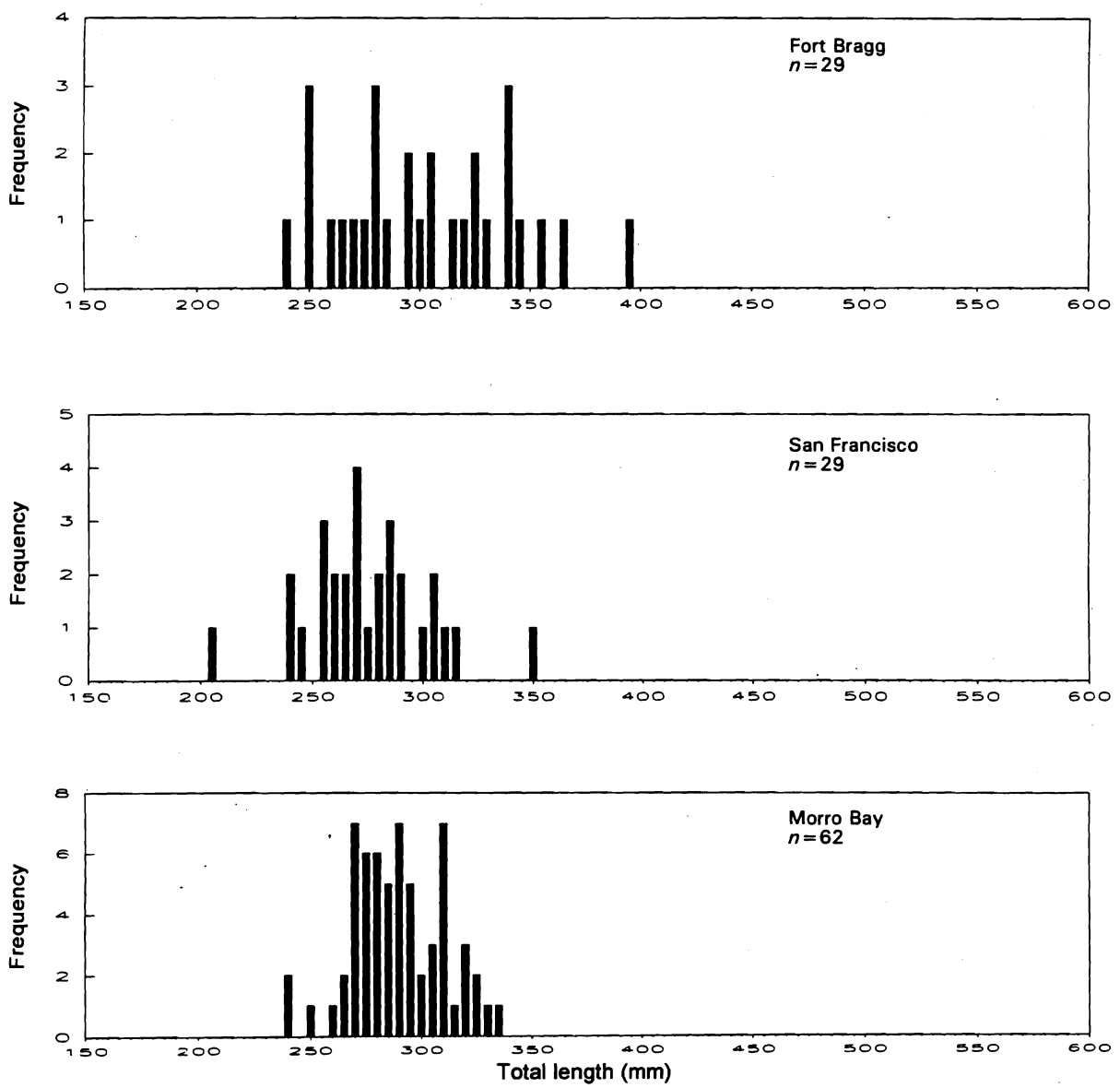

FIGURE 20. Length-frequency distribution of China rockfish by port area, 1992.

TABLE 1. Summary of commercial passenger fishing vessel trips sampled in northern and central California, 1992.

Port area	No. trips sampled	No. anglers observed	No. observed fish		Ave. no. of fish per angler day		per angler hr.	
			All	Kept	All	Kept	All	Kept
Fort Bragg	23	173	2,137	1,882	12.3	10.9	4.6	4.0
Bodega Bay	22	181	2,591	2,278	14.3	12.6	4.7	4.1
San Francisco	32	391	6,592	5,991	16.9	15.3	5.0	4.6
Monterey	80	687	8,693	8,185	12.7	11.9	3.8	3.6
Morro Bay	73	758	9,718	9,198	12.8	12.1	4.2	4.0
Total	230	2,190	29,731	27,534	13.6	12.6	4.3	4.0

TABLE 2. List of species caught by CPFV anglers in sampled trips from the port areas of Fort Bragg to Morro Bay, 1992 (* denotes < 0.05% of observed total).

COMMON NAME	SCIENTIFIC NAME	RANK	COUNT	PERCENT OF OBSERVED TOTAL
Blue rockfish	*Sebastes mystinus*	1	7358	24.8
Yellowtail rockfish	*Sebastes flavidus*	2	6204	20.9
Widow rockfish	*Sebastes entomelas*	3	2291	7.7
Rosy rockfish	*Sebastes rosaceus*	4	1534	5.2
Bocaccio	*Sebastes paucispinis*	5	1370	4.6
Chilipepper	*Sebastes goodei*	6	1362	4.6
Olive rockfish	*Sebastes serranoides*	7	1169	3.9
Lingcod	*Ophiodon elongatus*	8	1064	3.6
Vermilion rockfish	*Sebastes miniatus*	9	998	3.4
Canary rockfish	*Sebastes pinniger*	10	945	3.2
Greenspotted rockfish	*Sebastes chlorostictus*	11	760	2.6
Starry rockfish	*Sebastes constellatus*	12	690	2.3
Copper rockfish	*Sebastes caurinus*	13	680	2.3
Gopher rockfish	*Sebastes carnatus*	13	680	2.3
Black rockfish	*Sebastes melanops*	15	376	1.3
Pacific mackerel	*Scomber japonicus*	15	376	1.3
Greenstriped rockfish	*Sebastes elongatus*	17	324	1.1
Brown rockfish	*Sebastes auriculatus*	18	323	1.1
Pacific sanddab	*Citharichthys sordidus*	19	196	0.7
Speckled rockfish	*Sebastes ovalis*	20	166	0.6
Yelloweye rockfish	*Sebastes ruberrimus*	21	147	0.5
China rockfish	*Sebastes nebulosus*	22	123	0.4
Flag rockfish	*Sebastes rubrivinctus*	23	120	0.4
Squarespot rockfish	*Sebastes hopkinsi*	24	80	0.3
Unidentified sanddab	*Citharichthys sp.*	25	62	0.2
Kelp greenling	*Hexagrammos decagrammus*	26	34	0.1
Cabezon	*Scorpaenichthys marmoratus*	26	34	0.1
Jack mackerel	*Trachurus symmetricus*	28	25	0.1
Pacific barracuda	*Sphyraena argentea*	28	25	0.1
Quillback rockfish	*Sebastes maliger*	30	21	0.1
King salmon	*Onchorhynchus tshawytscha*	30	21	0.1
Rosethorn rockfish	*Sebastes helvomaculatus*	32	15	0.1
Rock sole	*Pleuronectes bilineatus*	32	15	0.1
Spiny dogfish	*Squalus acanthias*	34	14	*
Petrale sole	*Eopsetta jordani*	34	14	*
White croaker	*Genyonemus lineatus*	36	13	*
Kelp rockfish	*Sebastes atrovirens*	37	12	*
Black-and-yellow rockfish	*Sebastes chrysomelas*	37	12	*
Cowcod	*Sebastes levis*	39	10	*
Silver salmon	*Onchorhynchus kisutch*	40	9	*
Shortbelly rockfish	*Sebastes jordani*	41	7	*
Grass rockfish	*Sebastes rastrelliger*	42	5	*
Blue shark	*Prionace glauca*	42	5	*
Unidentified flatfish		42	5	*
Pacific sardine	*Sardinops sagax*	45	4	*
Unidentified rockfish	*Sebastes sp.*	45	4	*
Treefish	*Sebastes serriceps*	47	3	*
California halibut	*Paralichthys californicus*	47	3	*

TABLE 2. (continued)

COMMON NAME	SCIENTIFIC NAME	RANK	COUNT	PERCENT OF OBSERVED TOTAL
Wolf-eel	*Anarrhichthys ocellatus*	47	3	*
Sablefish	*Anoplopoma fimbria*	47	3	*
Redstripe rockfish	*Sebastes proriger*	51	2	*
Senorita	*Oxyjulis californica*	51	2	*
California sheephead	*Semicossyphus pulcher*	51	2	*
Ocean whitefish	*Caulolatilus princeps*	51	2	*
Bonito shark	*Isurus oxyrinchus*	55	1	*
Pacific bonito	*Sarda chiliensus*	55	1	*
Longspine combfish	*Zaniolepis latipinnis*	55	1	*
Pacific hake	*Merluccius productus*	55	1	*
Queenfish	*Seriphus politus*	55	1	*
Rubberlip surfperch	*Rhacochilus toxotes*	55	1	*
Brown smoothhound	*Mustelus henlei*	55	1	*
Stripetail rockfish	*Sebastes saxicola*	55	1	*
Calico rockfish	*Sebastes dalli*	55	1	*
TOTAL			29,731	

TABLE 3. Average fishing time per observed trip, 1992.

Port area	Fishing time (hrs.)
Fort Bragg	2.70
Bodega Bay	2.93
San Francisco	3.19
Monterey	3.22
Morro Bay	2.96
All ports	3.0

TABLE 4. Summary of sampled CPFV trips by depth of fishing locations for each port area, 1992.

Port area	Total Trips	Shallow	%	Deep	%	Mixed	%
Fort Bragg	23	18	78	3	13	2	9
Bodega Bay	22	7	32	11	50	4	18
San Francisco	32	16	50	5	16	11	34
Monterey	80	16	20	51	64	13	16
Morro Bay	73	29	40	16	22	28	38

TABLE 5. Summary of sampled CPFV trips by distance from port for each port area, 1992.

Port area	Total trips	Near	%	Distant	%	Mixed	%
Fort Bragg	23	20	87	3	11	0	0
Bodega Bay	22	3	14	15	68	4	18
San Francisco	32	11	34	17	53	4	13
Monterey	80	49	61	21	26	10	13
Morro Bay	73	60	82	10	14	3	4

TABLE 6. Mean catch per angler hour from shallow and deep fishing locations by port area, 1992.

	Shallow		Deep	
Port area	n fish	Mean CPAH	n fish	Mean CPAH
Fort Bragg	1,739	4.49	226	5.97
Bodega Bay	1,005	5.78	889	4.71
San Francisco	1,765	5.93	691	4.32
Monterey	1,120	4.76	4,774	3.38
Morro Bay	2,555	4.84	1,826	3.84

TABLE 7. Mean catch per angler hour from near and distant fishing locations by port area, 1992.

	Near		Distant	
Port area	n fish	Mean CPAH	n fish	Mean CPAH
Fort Bragg	1,739	4.49	226	5.97
Bodega Bay	1,005	5.78	889	4.71
San Francisco	1,765	5.93	691	4.32
Monterey	1,120	4.76	4,774	3.38
Morro Bay	2,555	4.84	1,826	3.84

TABLE 8. Summary of sport fishes caught by observed CPFV anglers from the port of Fort Bragg, 1992.

Species	Total Observed Catch	%	Rank
Blue rockfish	824	39	1
Yellowtail rockfish	337	16	2
Widow rockfish	277	13	3
Canary rockfish	143	7	4
Black rockfish	120	6	5
Rosy rockfish	120	6	5
Unidentified sanddab	54	3	7
Pacific mackerel	40	2	8
Lingcod	39	2	9
Olive rockfish	35	2	10
Copper rockfish	26	1	11
China rockfish	25	1	12
Vermilion rockfish	19	1	13
Yelloweye rockfish	16	1	14
Kelp Greenling	12	1	15
Gopher rockfish	10	-	16
Quillback rockfish	9	-	17
Bocaccio	7	-	18
Starry rockfish	6	-	19
Rosethorn rockfish	5	-	20
Unidentified flatfish	4	-	21
Cabezon	3	-	22
Silver salmon	2	-	23
Spiny dogfish	1	-	24
Black-and-Yellow rockfish	1	-	24
Greenspotted rockfish	1	-	24
King salmon	1	-	24
Total	**2,137**		

TABLE 9. Summary of sport fishes caught by observed CPFV anglers from the ports of Bodega Bay and Dillon Beach, 1992.

Species	Total Observed Catch	%	Rank
Yellowtail rockfish	901	35	1
Blue rockfish	458	18	2
Widow rockfish	287	11	3
Bocaccio	182	7	4
Chilipepper	161	6	5
Canary rockfish	158	6	6
Black rockfish	91	4	7
Greenspotted rockfish	83	3	8
Lingcod	41	2	9
Olive rockfish	41	2	9
Rosy rockfish	33	1	11
Pacific mackerel	32	1	12
Brown rockfish	22	1	13
Greenstriped rockfish	19	1	14
Yelloweye rockfish	16	1	15
Vermilion rockfish	15	1	16
Speckled rockfish	13	1	17
Unidentified sanddab	6	-	18
Copper rockfish	5	-	19
Jack mackerel	4	-	20
Rosethorn rockfish	4	-	20
Starry rockfish	4	-	20
China rockfish	4	-	20
Cowcod rockfish	3	-	24
Flag rockfish	3	-	24
Gopher rockfish	2	-	26
Unidentified rockfish	1	-	27
Silver salmon	1	-	27
King salmon	1	-	27
Total	2,591		

TABLE 10. Summary of sport fishes caught by observed CPFV anglers from the ports of Princeton, Berkeley, Emeryville, and Richmond, 1992.

Species	Total Observed Catch	%	Rank
Blue rockfish	1772	27	1
Yellowtail rockfish	1757	27	2
Rosy rockfish	703	11	3
Widow rockfish	321	5	4
Canary rockfish	282	4	5
Copper rockfish	264	4	6
Greenspotted rockfish	233	4	7
Lingcod	193	3	8
Starry rockfish	158	2	9
Olive rockfish	134	2	10
Bocaccio	123	2	11
Pacific mackerel	119	2	12
Black rockfish	105	2	13
Pacific sanddab	87	1	14
Vermilion rockfish	80	1	15
Brown rockfish	57	1	16
Yelloweye rockfish	43	1	17
China rockfish	29	-	18
Greenstriped rockfish	25	-	19
Gopher rockfish	22	-	20
King salmon	15	-	21
Flag rockfish	12	-	22
Speckled rockfish	8	-	23
Rock sole	7	-	24
Quillback rockfish	7	-	24
Kelp greenling	6	-	26
Cabezon	6	-	26
Squarespot rockfish	5	-	28
Spiny dogfish	4	-	29
Rosethorn rockfish	3	-	30
Blue shark	2	-	31
Redstripe rockfish	2	-	31
White croaker	2	-	31
Rockfish sp.	1	-	34
Brown smoothhound	1	-	34
Black-and-yellow rockfish	1	-	34
California halibut	1	-	34
Petrale sole	1	-	34
Pacific hake	1	-	34
Total	6,592		

TABLE 11. Summary of sport fishes caught by observed CPFV anglers from the ports of Santa Cruz and Monterey, 1992.

Species	Total observed Catch	%	Rank
Blue rockfish	1524	18	1
Yellowtail rockfish	1460	17	2
Chilipepper	1192	14	3
Widow rockfish	676	8	4
Bocaccio	662	8	5
Olive rockfish	553	6	6
Lingcod	438	5	7
Rosy rockfish	370	4	8
Greenspotted rockfish	341	4	9
Starry rockfish	273	3	10
Greenstriped rockfish	232	3	11
Pacific mackerel	129	1	12
Copper rockfish	141	1	13
Canary rockfish	106	1	14
Vermilion rockfish	92	1	15
Speckled rockfish	84	1	16
Pacific sanddab	73	1	17
Squarespot rockfish	68	1	18
Flag rockfish	63	1	19
Gopher rockfish	54	1	20
Yelloweye rockfish	39	-	21
Jack mackerel	21	-	22
Brown rockfish	14	-	23
China rockfish	13	-	24
Rock sole	8	-	25
Shortbelly rockfish	7	-	26
Cowcod	7	-	26
Silver salmon	6	-	28
Cabezon	6	-	28
Quillback rockfish	5	-	30
Petrale sole	5	-	30
King salmon	4	-	32
Sablefish	3	-	33
Pacific sardine	3	-	33
Kelp rockfish	3	-	33
Wolf eel	3	-	33
Kelp greenling	3	-	33
Rockfish spp.	2	-	38
Rosethorn rockfish	2	-	38
Sanddab spp.	2	-	38
Grass rockfish	1	-	41
Stripetail rockfish	1	-	41
Pacific bonito	1	-	41
Ocean whitefish	1	-	41
Blue shark	1	-	41
Spiny dogfish	1	-	41
Total	8,693		

TABLE 12. Summary of sport fishes caught by observed CPFV anglers from the ports of San Simeon, Morro Bay, and Port San Luis, 1992.

Species	Total Observed Catch	%	Rank
Blue rockfish	2780	29	1
Yellowtail rockfish	1749	18	2
Vermilion rockfish	792	8	3
Widow rockfish	730	8	4
Gopher rockfish	592	6	5
Olive rockfish	406	4	6
Bocaccio	396	4	7
Lingcod	353	4	8
Rosy rockfish	308	3	9
Copper rockfish	257	3	10
Canary rockfish	256	3	11
Starry rockfish	249	3	12
Brown rockfish	230	2	13
Greenspotted rockfish	102	1	14
Speckled rockfish	61	1	15
Black rockfish	60	1	16
China rockfish	52	1	17
Greenstriped rockfish	48	-	18
Pacific mackerel	44	-	19
Flag rockfish	42	-	20
Pacific sanddab	36	-	21
Yelloweye rockfish	33	-	22
California barracuda	25	-	23
Cabezon	19	-	24
Kelp greenling	13	-	25
White croaker	11	-	26
Black-and-yellow rockfish	10	-	27
Kelp rockfish	9	-	28
Chilipepper	9	-	28
Spiny dogfish	8	-	30
Petrale sole	8	-	30
Squarespot rockfish	7	-	32
Grass rockfish	4	-	33
Treefish	3	-	34
California sheephead	2	-	35
Senorita	2	-	35
California halibut	2	-	35
Blue shark	2	-	35
Queenfish	1	-	39
Ocean whitefish	1	-	39
Rosethorn rockfish	1	-	39
Rubberlip surfperch	1	-	39
Longspine combfish	1	-	39
King salmon	1	-	39
Calico rockfish	1	-	39
Total	9,718		

TABLE 13. Average catch per angler hour by month for the 20 most frequently caught species from the Fort Bragg area, 1992.

	Catch per angler hour											
Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Blue rockfish	2.01	1.45	2.70	5.39	1.03	0.93	1.44	1.53	1.72	2.08	0.44	2.14
Yellowtail rockfish	0.20	0.23	0.13	0.73	0.94	1.52	1.48	0.48	0.71	1.24	--	0.88
Widow rockfish	1.93	0.40	1.04	3.35	0.31	0.73	0.21	0.02	0.07	0.36	0.04	0.60
Canary rockfish	0.20	0.51	0.41	0.36	0.33	0.41	0.41	0.05	0.11	0.36	0.13	0.38
Black rockfish	--	0.11	0.43	--	0.74	--	0.27	0.02	0.14	0.59	--	--
Rosy rockfish	0.24	0.37	0.03	1.09	0.22	0.14	--	0.24	0.59	0.19	0.18	0.49
Unidentified Sanddab	--	--	--	--	--	--	0.02	--	--	--	--	2.36
Pacific mackerel	--	--	--	--	0.41	--	--	--	--	--	--	0.99
Lingcod	--	0.14	0.25	--	0.04	0.02	0.10	--	0.04	0.04	0.22	0.05
Olive rockfish	--	--	0.01	0.07	--	--	0.24	0.28	0.18	0.08	--	--
Copper rockfish	--	--	0.01	--	0.09	0.06	0.14	0.02	0.05	0.10	--	0.22
China rockfish	--	0.06	0.03	--	0.07	--	0.03	0.16	0.11	0.04	0.04	--
Vermilion rockfish	--	--	--	--	0.06	0.10	0.03	--	0.05	0.15	--	--
Yelloweye rockfish	--	0.03	0.01	--	0.04	0.08	0.03	0.02	--	0.02	--	0.11
Kelp greenling	--	--	0.06	--	0.06	--	--	--	0.04	0.06	--	--
Gopher rockfish	--	--	0.01	0.22	0.09	--	--	--	0.04	--	0.09	--
Quillback rockfish	--	--	0.03	--	0.04	0.04	--	--	0.02	--	0.04	0.05
Bocaccio	--	0.03	--	0.07	--	0.04	--	--	--	0.06	--	--
Starry rockfish	--	--	--	--	0.04	--	--	--	0.02	0.06	--	--
Rosethorn rockfish	--	--	--	--	--	--	0.17	--	--	--	--	--
All fish	**4.58**	**3.35**	**5.20**	**11.29**	**4.56**	**4.07**	**4.63**	**2.80**	**3.89**	**5.44**	**3.64**	**5.93**
Total Trips	**1**	**2**	**4**	**1**	**3**	**2**	**2**	**2**	**2**	**2**	**1**	**1**

TABLE 14. Average catch per angler hour by month for the 20 most frequently caught species from the Bodega Bay area, 1992.

	Catch per angler hour											
Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Yellowtail rockfish		1.46	3.11	2.11	2.05	4.15	1.29	1.49	2.24	1.39	1.21	0.44
Blue rockfish		--	--	0.06	1.53	--	1.42	--	3.14	--	1.24	1.84
Widow rockfish		--	0.76	0.26	0.72	0.03	0.03	0.55	0.35	0.55	1.03	0.48
Bocaccio		1.00	0.64	0.51	0.34	0.24	0.15	0.12	--	0.65	0.05	0.18
Chilipepper		1.90	--	0.06	0.18	--	--	--	--	0.24	0.31	--
Canary rockfish		0.46	0.04	1.09	0.58	0.14	0.42	0.03	0.15	0.38	0.07	0.18
Black rockfish		--	--	--	0.02	--	1.01	--	0.50	--	--	--
Greenspotted rockfish		0.11	--	0.06	0.08	0.03	--	--	--	0.13	0.46	--
Lingcod		0.04	0.08	0.13	0.20	0.03	0.09	0.03	0.05	0.04	0.08	0.04
Olive rockfish		--	--	--	0.27	--	0.18	0.18	0.05	0.01	0.03	0.04
Rosy rockfish		--	0.16	--	0.16	--	0.01	0.18	--	0.02	0.08	0.04
Pacific mackerel		--	--	0.32	--	--	--	--	--	--	0.21	--
Brown rockfish		--	--	--	0.14	--	0.13	--	0.10	--	0.01	0.09
Greenstriped rockfish		0.09	--	--	0.06	--	--	--	--	0.05	0.05	--
Yelloweye rockfish		0.02	0.04	--	0.02	0.10	0.01	--	--	0.04	0.04	0.00
Vermilion rockfish		--	--	--	0.02	--	0.14	0.03	--	--	0.02	--
Speckled rockfish		0.07	0.08	--	0.02	0.03	--	0.09	--	0.01	0.02	--
Unidentified Sanddab		--	--	--	--	--	--	--	--	--	0.01	0.04
Copper rockfish		--	--	--	0.02	--	0.03	--	--	--	0.01	0.04
Jack mackerel		--	0.08	--	0.02	--	--	--	--	--	--	0.04
All fish		**5.17**	**4.98**	**4.61**	**6.51**	**4.83**	**4.95**	**2.71**	**6.63**	**3.59**	**4.96**	**3.42**
Total Trips	**0**	**2**	**1**	**2**	**3**	**1**	**3**	**1**	**1**	**3**	**3**	**2**

TABLE 15. Average catch per angler hour by month for the 20 most frequently caught species from the San Francisco area, 1992.

	Catch per angler hour										
Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Blue rockfish		0.20	0.96	0.85	2.63	2.79	0.77	0.68	3.05	2.59	1.06	0.78
Yellowtail rockfish		1.83	1.75	1.08	0.80	1.99	0.82	1.59	1.17	1.51	2.08	0.46
Rosy rockfish		0.07	0.87	0.50	1.59	0.40	0.38	0.70	0.44	0.78	0.37	0.46
Widow rockfish		0.07	0.11	0.55	2.69	0.24	0.02	0.29	0.39	0.09	0.15	0.23
Canary rockfish		0.29	0.41	0.31	0.24	0.23	0.27	0.11	0.22	0.16	0.12	0.28
Copper rockfish		--	0.05	0.08	0.06	0.16	0.46	0.10	0.05	0.15	0.34	0.32
Greenspotted rockfish		0.07	0.26	0.06	--	0.02	0.52	0.05	0.05	0.07	0.22	0.05
Lingcod		0.35	0.05	--	--	0.11	0.13	0.17	0.23	0.10	0.11	0.18
Starry rockfish		0.03	0.06	0.11	0.24	0.06	0.13	0.18	0.17	0.05	0.07	0.07
Olive rockfish		--	0.18	0.05	--	0.11	0.05	0.21	0.13	0.07	0.06	--
Bocaccio		0.20	0.08	0.08	0.12	0.05	0.22	0.08	0.02	0.01	0.07	0.02
Pacific mackerel		--	--	0.01	1.78	0.44	0.06	--	0.14	0.04	0.06	--
Black rockfish		--	--	--	--	--	0.09	--	0.52	--	--	--
Pacific sanddab		0.03	--	0.09	0.31	0.12	0.10	0.02	0.05	0.13	0.02	0.02
Vermilion rockfish		0.03	0.05	0.03	--	0.12	0.06	0.06	0.11	0.05	0.02	0.05
Brown rockfish		--	--	--	0.18	0.20	0.04	0.03	--	0.06	0.03	0.04
Yelloweye rockfish		--	0.12	0.02	--	0.03	0.04	0.03	0.02	0.04	--	0.02
China rockfish		--	--	0.02	--	0.05	--	0.02	0.05	0.04	0.02	0.04
Greenstriped rockfish		0.02	0.01	--	--	0.06	0.01	--	0.01	--	--	--
Gopher rockfish		--	--	--	--	--	0.03	--	0.07	0.03	--	--
All fish		**2.84**	**5.31**	**3.92**	**10.66**	**7.23**	**4.35**	**4.38**	**6.98**	**6.05**	**4.91**	**3.05**
Total Trips	**0**	**1**	**2**	**3**	**1**	**3**	**4**	**4**	**6**	**5**	**2**	**1**

TABLE 16. Average catch per angler hour by month for the 20 most frequently caught species from the Monterey area, 1992.

	Catch per angler hour											
Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Blue rockfish	0.18	0.01	0.27	0.33	0.01	0.73	1.54	2.66	1.64	0.68	0.46	0.23
Yellowtail rockfish	1.06	0.56	0.96	0.65	0.69	0.82	0.57	0.56	0.70	0.68	0.27	0.17
Chilipepper	0.85	0.08	0.01	1.06	1.73	0.10	0.92	2.16	0.12	0.08	0.03	--
Widow rockfish	0.04	0.38	0.73	0.62	0.72	0.10	0.05	--	0.17	0.45	0.07	0.09
Bocaccio	0.44	0.89	0.83	0.20	0.17	0.04	0.08	0.08	0.67	0.14	0.19	0.05
Olive rockfish	0.05	--	0.02	0.10	--	0.49	0.27	0.56	0.39	0.60	0.26	0.04
Lingcod	0.04	0.08	0.14	0.06	0.06	0.07	0.11	0.18	0.22	0.51	0.25	0.34
Rosy rockfish	0.25	0.24	0.31	0.13	0.09	0.16	0.24	0.17	0.10	0.08	0.12	0.14
Greenspotted rockfish	0.39	0.34	0.21	0.04	0.11	0.19	0.06	0.03	0.21	0.11	0.13	0.01
Starry rockfish	0.16	0.22	0.07	0.06	0.09	0.07	0.05	0.03	0.12	0.16	0.21	0.09
Greenstriped rockfish	0.20	0.18	0.10	0.01	0.09	0.11	0.13	0.35	0.18	0.03	0.07	0.01
Pacific mackerel	0.09	--	--	0.11	0.01	0.15	0.07	--	--	0.08	0.03	0.18
Copper rockfish	0.02	0.01	0.12	0.10	0.01	0.02	0.11	0.03	0.07	0.07	0.03	0.01
Canary rockfish	0.06	0.01	0.03	0.02	0.08	0.04	0.10	0.05	0.05	0.04	0.03	0.01
Vermilion rockfish	0.03	0.01	0.05	0.01	0.02	0.03	0.06	0.30	0.04	0.05	0.03	0.01
Speckled rockfish	0.04	0.21	0.07	0.02	0.04	0.04	0.01	--	0.03	0.03	0.02	0.02
Pacific sanddab	0.03	0.12	0.09	--	0.01	0.09	--	0.03	0.01	0.01	0.03	0.05
Squarespot rockfish	--	--	0.18	--	--	0.01	0.01	--	--	0.05	0.02	0.07
Flag rockfish	0.02	0.20	0.07	0.03	--	0.04	0.02	--	0.01	0.01	0.03	--
Gopher rockfish	0.01	--	--	--	--	0.01	0.12	0.08	0.05	0.01	0.01	0.01
All fish	**4.03**	**3.64**	**4.30**	**3.66**	**3.98**	**3.36**	**4.65**	**7.36**	**4.84**	**3.93**	**2.30**	**1.59**
Total Trips	**7**	**4**	**8**	**8**	**8**	**5**	**9**	**3**	**6**	**9**	**8**	**5**

TABLE 17. Average catch per angler hour by month for the 20 most frequently caught species from the Morro Bay area, 1992.

	Catch per angler hour											
Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Blue rockfish	0.52	1.15	1.19	0.83	0.94	2.14	1.44	1.53	1.30	1.14	1.24	1.08
Yellowtail rockfish	1.31	0.60	1.12	0.52	0.42	0.80	0.52	0.61	0.96	1.04	0.59	--
Vermilion rockfish	0.57	0.21	0.51	0.37	0.53	0.20	0.21	0.47	0.34	0.48	0.19	--
Widow rockfish	0.33	0.30	0.73	0.24	0.71	0.10	0.32	0.01	0.53	0.29	0.19	--
Gopher rockfish	--	0.21	0.01	0.36	0.25	0.39	0.41	0.25	0.26	0.10	0.38	0.41
Olive rockfish	0.05	0.07	--	0.16	0.10	0.21	0.33	0.35	0.17	0.25	0.18	0.36
Bocaccio	0.52	0.14	0.12	0.09	0.06	0.12	0.23	0.19	0.16	0.19	0.21	--
Lingcod	0.07	0.10	0.14	0.07	0.18	0.20	0.13	0.19	0.16	0.14	0.28	0.05
Rosy rockfish	0.11	0.05	0.18	0.09	0.08	0.11	0.11	0.30	0.13	0.19	0.16	--
Copper rockfish	0.03	0.11	0.14	0.07	0.10	0.09	0.05	0.09	0.17	0.13	0.21	--
Canary rockfish	0.25	0.13	0.09	0.05	0.12	0.10	0.16	0.11	0.04	0.14	0.08	--
Starry rockfish	0.17	0.04	0.04	0.13	0.02	0.05	0.04	0.21	0.10	0.21	0.14	--
Brown rockfish	--	--	--	0.01	0.26	0.03	0.01	0.29	0.12	0.24	0.01	0.59
Greenspotted rockfish	0.04	0.05	0.04	0.05	0.06	0.02	0.01	0.05	0.05	0.04	0.04	--
Speckled rockfish	0.03	--	--	--	0.02	--	--	0.01	0.02	0.05	0.08	--
Black rockfish	--	--	--	--	0.05	--	0.05	0.02	0.03	0.02		0.64
China rockfish	--	0.03	--	0.01	0.02	0.01	0.02	0.06	0.01	0.03	0.02	0.10
Greenstriped rockfish	0.02	0.02	0.02	0.01	0.01	--	0.03	0.01	0.02	0.02	0.08	--
Pacific mackerel	--	--	0.02	0.04	--	0.03	--	--	--	0.03	0.02	--
Flag rockfish	0.02	0.02	0.04	0.02	0.01	--	0.01	0.03	0.01	0.03	0.02	--
All fish	**4.08**	**3.27**	**4.60**	**3.17**	**4.13**	**4.72**	**4.12**	**4.83**	**4.67**	**4.86**	**4.24**	**3.23**
Total Trips	**6**	**6**	**5**	**6**	**7**	**8**	**5**	**5**	**9**	**7**	**5**	**4**

Table 18. Percentage of observed fish kept by port, 1992.

Port area	Percent
Fort Bragg	88.1
Bodega Bay	93.8
San Francisco	90.9
Monterey	94.4
Morro Bay	94.6
All ports	92.6

TABLE 19. Percentage of observed fish kept by port and species, 1992.

	Percent retained (n ≥ 10) Port area				
Species	FB	BB	SF	MT	MB
Blue rockfish	89.0	88.6	85.9	93.2	94.6
Yellowtail rockfish	97.9	96.4	97.0	98.0	98.1
Widow rockfish	97.1	95.8	94.4	99.8	98.8
Rosy rockfish	81.7	69.7	82.4	89.2	74.3
Bocaccio	-	100.0	100.0	99.8	100.0
Chilipepper	-	99.4	-	99.1	-
Olive rockfish	100.0	100.0	99.3	97.6	100.0
Lingcod	59.0	78.0	69.4	54.3	54.1
Vermilion rockfish	100.0	100.0	98.8	100.0	100.0
Canary rockfish	93.7	98.7	96.1	100.0	100.0
Greenspotted rockfish	-	95.2	97.0	97.4	100.0
Starry rockfish	-	-	94.9	97.4	98.7
Copper rockfish	100.0	-	98.5	100.0	100.0
Gopher rockfish	-	-	95.5	88.7	99.6
Black rockfish	92.5	96.7	70.5	-	100.0
Pacific mackerel	-	43.8	92.4	77.6	-
Greenstriped rockfish	-	89.5	96.0	98.7	89.1
Brown rockfish	-	90.9	98.2	100.0	100.0
Pacific sanddab	-	-	93.1	81.8	94.4
Speckled rockfish	-	100.0	-	100.0	97.8

TABLE 20. Catch per angler day (CPAD) and catch per angler hour (CPAH) for blue rockfish by port, 1992.

Port area	CPAD	CPAH
Fort Bragg	4.76	1.76
Bodega Bay	2.53	0.84
San Francisco	4.53	1.36
Monterey	2.22	0.67
Morro Bay	3.67	1.21

TABLE 21. Catch per angler hour (CPAH) for blue rockfish for near and distant locations and shallow and deep locations by port, 1992.

	CPAH			
Port area	Near	Distant	Shallow	Deep
Fort Bragg	1.60	2.73	1.81	0.53
Bodega Bay	2.08	0.60	2.63	0.01
San Francisco	1.97	1.08	3.04	0.02
Monterey	0.66	0.67	2.65	<0.01
Morro Bay	1.33	0.65	2.02	0.49

TABLE 22. Mean length of blue rockfish for near (N) and distant (Dt) locations and shallow (S) and deep (Dp) locations by port, 1992.

	Number of fish measured					Mean total length (mm)				
Port area	All	N	Dt	S	Dp	All	N	Dt	S	Dp
Fort Bragg	856	713	68	768	4	312	310	321	311	340
Bodega Bay	589	136	98	587	-	319	311	355	319	-
San Francisco	1495	417	780	562	2	306	316	305	295	336
Monterey	1452	787	473	274	2	301	294	319	315	335
Morro Bay	3427	2960	185	584	199	291	291	294	292	300

TABLE 23. Catch per angler day (CPAD) and catch per angler hour (CPAH) for yellowtail rockfish by port, 1992.

Port area	CPAD	CPAH
Fort Bragg	1.95	0.72
Bodega Bay	4.98	0.84
San Francisco	4.49	1.34
Monterey	2.13	0.64
Morro Bay	2.31	1.21

TABLE 24. Catch per angler hour (CPAH) for yellowtail rockfish for near and distant locations and shallow and deep locations by port, 1992.

	CPAH			
Port area	Near	Distant	Shallow	Deep
Fort Bragg	0.71	0.77	0.51	3.01
Bodega Bay	0.73	1.82	1.13	2.09
San Francisco	1.03	1.49	0.52	1.53
Monterey	0.50	0.94	0.33	0.71
Morro Bay	0.81	0.54	0.34	0.96

TABLE 25. Mean length of yellowtail rockfish for near (N) and distant (Dt) locations and shallow (S) and deep (Dp) locations by port, 1992.

	Number of fish measured					Mean total length (mm)				
Port area	All	N	Dt	S	Dp	All	N	Dt	S	Dp
Fort Bragg	367	319	46	270	45	324	323	328	323	323
Bodega Bay	1484	66	1311	216	279	398	303	410	315	419
San Francisco	1479	253	1075	72	206	332	312	341	269	350
Monterey	1758	669	781	16	1105	354	354	352	312	368
Morro Bay	2122	1760	232	162	468	291	288	310	292	298

TABLE 26. Catch per angler day (CPAD) and catch per angler hour (CPAH) for widow rockfish by port, 1992.

Port area	CPAD	CPAH
Fort Bragg	1.60	0.59
Bodega Bay	1.59	0.52
San Francisco	0.82	0.25
Monterey	0.98	0.30
Morro Bay	0.96	0.32

TABLE 27. Catch per angler hour (CPAH) for widow rockfish for near and distant locations and shallow and deep locations by port, 1992.

	CPAH			
Port area	Near	Distant	Shallow	Deep
Fort Bragg	0.68	0.08	0.63	0.66
Bodega Bay	0.15	0.59	0.50	0.57
San Francisco	0.36	0.19	0.15	0.03
Monterey	0.39	0.09	0.04	0.41
Morro Bay	0.33	0.25	0.04	0.46

TABLE 28. Mean length of widow rockfish for near (N) and distant (Dt) locations and shallow (S) and deep (Dp) locations by port, 1992.

	Number of fish measured					Mean total length (mm)				
Port area	All	N	Dt	S	Dp	All	N	Dt	S	Dp
Fort Bragg	335	322	13	312	13	301	301	300	301	300
Bodega Bay	449	7	386	70	162	419	281	440	290	445
San Francisco	245	85	139	30	4	317	311	324	296	426
Monterey	763	559	36	-	502	365	362	354	-	365
Morro Bay	934	799	16	71	155	323	321	314	325	345

TABLE 29. Catch per angler day (CPAD) and catch per angler hour (CPAH) for rosy rockfish by port, 1992.

Port area	CPAD	CPAH
Fort Bragg	0.69	0.26
Bodega Bay	0.18	0.06
San Francisco	1.80	0.54
Monterey	0.54	0.16
Morro Bay	0.41	0.13

TABLE 30. Catch per angler hour (CPAH) for rosy rockfish for near and distant locations and shallow and deep locations by port, 1992.

	CPAH			
Port area	Near	Distant	Shallow	Deep
Fort Bragg	0.29	0.05	0.30	0.11
Bodega Bay	0.03	0.07	0.05	0.03
San Francisco	0.52	0.55	0.34	0.61
Monterey	0.17	0.15	0.13	0.12
Morro Bay	0.14	0.12	0.11	0.13

TABLE 31. Mean length of rosy rockfish for near (N) and distant (Dt) locations and shallow (S) and deep (Dp) locations by port, 1992.

	Number of fish measured					Mean total length (mm)				
Port area	All	N	Dt	S	Dp	All	N	Dt	S	Dp
Fort Bragg	119	118	1	118	1	242	242	253	242	253
Bodega Bay	21	1	18	3	-	250	253	249	256	-
San Francisco	450	102	285	12	75	223	226	224	217	221
Monterey	289	179	56	2	133	231	229	235	224	233
Morro Bay	266	231	23	30	46	227	226	230	223	229

TABLE 32. Catch per angler day (CPAD) and catch per angler hour (CPAH) for bocaccio by port, 1992.

Port area	CPAD	CPAH
Fort Bragg	0.04	0.02
Bodega Bay	1.01	0.33
San Francisco	0.31	0.09
Monterey	0.96	0.29
Morro Bay	0.52	0.17

TABLE 33. Catch per angler hour (CPAH) for bocaccio for near and distant locations and shallow and deep locations by port, 1992.

	CPAH			
Port area	Near	Distant	Shallow	Deep
Fort Bragg	0.02	--	0.01	0.05
Bodega Bay	--	0.39	0.01	0.66
San Francisco	0.04	0.12	0.03	0.31
Monterey	0.30	0.27	0.02	0.36
Morro Bay	0.14	0.33	0.05	0.32

TABLE 34. Mean length of bocaccio for near (N) and distant (Dt) locations and shallow (S) and deep (Dp) locations by port, 1992.

	Number of fish measured					Mean total length (mm)				
Port area	All	N	Dt	S	Dp	All	N	Dt	S	Dp
Fort Bragg	7	7	-	7	-	444	444	-	444	-
Bodega Bay	372	-	372	-	198	590	-	590	-	581
San Francisco	89	16	68	2	6	495	480	498	495	528
Monterey	607	451	156	-	474	486	487	478	-	484
Morro Bay	543	335	127	35	141	474	464	499	437	496

TABLE 35. Catch per angler day (CPAD) and catch per angler hour (CPAH) for chilipepper by port, 1992.

Port area	CPAD	CPAH
Fort Bragg	-	-
Bodega Bay	0.89	0.29
San Francisco	-	-
Monterey	1.74	0.52
Morro Bay	0.01	<0.01

TABLE 36. Catch per angler hour (CPAH) for chilipepper for near and distant locations and shallow and deep locations by port, 1992.

	CPAH			
Port area	Near	Distant	Shallow	Deep
Fort Bragg	-	-	-	-
Bodega Bay	-	0.35	-	0.32
San Francisco	-	-	-	-
Monterey	0.61	0.33	-	0.84
Morro Bay	<0.01	<0.01	-	0.02

TABLE 37. Mean length of chilipepper for near (N) and distant (Dt) locations and shallow (S) and deep (Dp) locations by port, 1992.

	Number of fish measured					Mean total length (mm)				
Port area	All	N	Dt	S	Dp	All	N	Dt	S	Dp
Fort Bragg	-	-	-	-	-	-	-	-	-	-
Bodega Bay	361	-	361	-	132	433	-	433	-	431
San Francisco	-	-	-	-	-	-	-	-	-	-
Monterey	1415	1130	139	-	1357	324	321	351	-	321
Morro Bay	12	10	1	-	11	338	321	357	-	-

TABLE 38. Catch per angler day (CPAD) and catch per angler hour (CPAH) for olive rockfish by port, 1992.

Port area	CPAD	CPAH
Fort Bragg	0.20	0.08
Bodega Bay	0.23	0.07
San Francisco	0.34	0.10
Monterey	0.80	0.24
Morro Bay	0.54	0.18

TABLE 39. Catch per angler hour (CPAH) for olive rockfish for near and distant locations and shallow and deep locations by port, 1992.

	CPAH			
Port area	Near	Distant	Shallow	Deep
Fort Bragg	0.05	0.21	0.06	-
Bodega Bay	0.06	0.08	0.12	0.07
San Francisco	0.07	0.12	0.05	-
Monterey	0.17	0.40	0.43	<.01
Morro Bay	0.16	0.27	0.39	0.06

TABLE 40. Mean length of olive rockfish for near (N) and distant (Dt) locations and shallow (S) and deep (Dp) locations by port, 1992.

	Number of fish measured					Mean total length (mm)				
Port area	All	N	Dt	S	Dp	All	N	Dt	S	Dp
Fort Bragg	41	25	6	30	-	389	385	403	389	-
Bodega Bay	86	9	68	20	-	383	332	390	360	-
San Francisco	110	12	90	10	-	375	338	381	360	-
Monterey	686	271	393	71	1	397	382	408	389	398
Morro Bay	504	362	86	104	23	373	373	365	358	431

TABLE 41. Catch per angler day (CPAD) and catch per angler hour (CPAH) for lingcod by port, 1992.

Port area	CPAD	CPAH
Fort Bragg	0.23	0.08
Bodega Bay	0.23	0.08
San Francisco	0.49	0.15
Monterey	0.64	0.19
Morro Bay	0.47	0.15

TABLE 42. Catch per angler hour (CPAH) for lingcod for near and distant locations and shallow and deep locations by port, 1992.

	CPAH			
Port area	Near	Distant	Shallow	Deep
Fort Bragg	0.09	0.05	0.09	-
Bodega Bay	0.11	0.07	0.07	0.04
San Francisco	0.08	0.18	0.14	0.26
Monterey	0.17	0.24	0.25	0.12
Morro Bay	0.14	0.22	0.19	0.14

TABLE 43. Mean length of lingcod for near (N) and distant (Dt) locations and shallow (S) and deep (Dp) locations by port, 1992.

	Number of fish measured					Mean total length (mm)				
Port area	All	N	Dt	S	Dp	All	N	Dt	S	Dp
Fort Bragg	31	28	2	28	1	670	671	631	670	548
Bodega Bay	48	1	34	16	8	704	706	738	640	699
San Francisco	128	9	114	19	32	628	612	629	652	618
Monterey	301	108	100	40	98	647	673	622	613	693
Morro Bay	210	142	31	32	22	626	623	651	647	656

TABLE 44. Catch per angler day (CPAD) and catch per angler hour (CPAH) for vermilion rockfish by port, 1992.

Port area	CPAD	CPAH
Fort Bragg	0.11	0.04
Bodega Bay	0.08	0.03
San Francisco	0.20	0.06
Monterey	0.13	0.04
Morro Bay	1.04	0.34

TABLE 45. Catch per angler hour (CPAH) for vermilion rockfish for near and distant locations and shallow and deep locations by port, 1992.

	CPAH			
Port area	Near	Distant	Shallow	Deep
Fort Bragg	0.03	0.12	0.04	0.08
Bodega Bay	0.13	0.01	0.06	0.01
San Francisco	0.06	0.06	0.11	0.03
Monterey	0.03	0.06	0.13	0.03
Morro Bay	0.35	0.30	0.17	0.50

TABLE 46. Mean length of vermilion rockfish for near (N) and distant (Dt) locations and shallow (S) and deep (Dp) locations by port, 1992.

	Number of fish measured					Mean total length (mm)				
Port area	All	N	Dt	S	Dp	All	N	Dt	S	Dp
Fort Bragg	20	13	6	16	1	492	479	514	503	425
Bodega Bay	16	6	5	11	-	416	347	503	376	-
San Francisco	72	13	46	27	3	427	416	448	399	421
Monterey	119	44	61	33	38	439	450	422	394	475
Morro Bay	946	780	118	66	242	413	412	414	420	409

TABLE 47. Catch per angler day (CPAD) and catch per angler hour (CPAH) for canary rockfish by port, 1992.

Port area	CPAD	CPAH
Fort Bragg	0.83	0.31
Bodega Bay	0.87	0.29
San Francisco	0.72	0.22
Monterey	0.15	0.05
Morro Bay	0.34	0.11

TABLE 48. Catch per angler hour (CPAH) for canary rockfish for near and distant locations and shallow and deep locations by port, 1992.

	CPAH			
Port area	Near	Distant	Shallow	Deep
Fort Bragg	0.29	0.41	0.29	0.66
Bodega Bay	0.62	0.23	0.34	0.33
San Francisco	0.34	0.16	0.34	0.16
Monterey	0.04	0.06	0.09	0.05
Morro Bay	0.11	0.12	0.06	0.24

TABLE 49. Mean length of canary rockfish for near (N) and distant (Dt) locations and shallow (S) and deep (Dp) locations by port, 1992.

	Number of fish measured					Mean total length (mm)				
Port area	All	N	Dt	S	Dp	All	N	Dt	S	Dp
Fort Bragg	166	123	43	116	35	327	324	334	326	324
Bodega Bay	245	72	154	94	56	413	313	475	311	506
San Francisco	239	67	107	44	23	316	330	325	278	283
Monterey	126	60	52	15	64	360	376	342	306	377
Morro Bay	333	270	36	26	110	364	364	365	355	384

TABLE 50. Catch per angler day (CPAD) and catch per angler hour (CPAH) for greenspotted rockfish by port, 1992.

Port area	CPAD	CPAH
Fort Bragg	0.01	<0.01
Bodega Bay	0.46	0.15
San Francisco	0.60	0.18
Monterey	0.50	0.15
Morro Bay	0.13	0.04

TABLE 51. Catch per angler hour (CPAH) for greenspotted rockfish for near and distant locations and shallow and deep locations by port, 1992.

	CPAH			
Port area	Near	Distant	Shallow	Deep
Fort Bragg	-	0.02	-	0.03
Bodega Bay	-	0.18	-	0.37
San Francisco	0.03	0.24	0.01	0.38
Monterey	0.12	0.22	-	0.23
Morro Bay	0.03	0.09	<0.01	0.07

TABLE 52. Mean length of greenspotted rockfish for near (N) and distant (Dt) locations and shallow (S) and deep (Dp) locations by port, 1992.

	Number of fish measured					Mean total length (mm)				
Port area	All	N	Dt	S	Dp	All	N	Dt	S	Dp
Fort Bragg	-	-	-	-	-	-	-	-	-	-
Bodega Bay	93	-	93	-	15	361	-	361	-	347
San Francisco	169	16	143	-	33	322	287	325	-	326
Monterey	412	170	144	-	334	318	314	322	-	319
Morro Bay	147	89	31	1	33	321	317	329	310	337

TABLE 53. Catch per angler day (CPAD) and catch per angler hour (CPAH) for starry rockfish by port, 1992.

Port area	CPAD	CPAH
Fort Bragg	0.15	0.06
Bodega Bay	0.03	0.01
San Francisco	0.68	0.20
Monterey	0.19	0.06
Morro Bay	0.34	0.11

TABLE 54. Catch per angler hour (CPAH) for starry rockfish for near and distant locations and shallow and deep locations by port, 1992.

	CPAH			
Port area	Near	Distant	Shallow	Deep
Fort Bragg	0.02	-	0.02	-
Bodega Bay	-	0.01	0.01	-
San Francisco	0.07	0.14	0.05	0.16
Monterey	0.09	0.18	0.06	0.08
Morro Bay	0.11	0.09	0.10	0.12

TABLE 55. Mean length of starry rockfish for near (N) and distant (Dt) locations and shallow (S) and deep (Dp) locations by port, 1992.

	Number of fish measured					Mean total length (mm)				
Port area	All	N	Dt	S	Dp	All	N	Dt	S	Dp
Fort Bragg	8	8	-	8	-	285	285	-	285	-
Bodega Bay	13	-	12	1	2	346	-	351	278	353
San Francisco	151	28	119	4	15	305	288	310	259	316
Monterey	295	123	116	-	99	307	293	322	-	296
Morro Bay	294	237	35	33	61	303	300	316	294	300

TABLE 56. Catch per angler day (CPAD) and catch per angler hour (CPAH) for copper rockfish by port, 1992.

Port area	CPAD	CPAH
Fort Bragg	0.03	0.01
Bodega Bay	0.02	0.01
San Francisco	0.40	0.12
Monterey	0.40	0.12
Morro Bay	0.33	0.11

TABLE 57. Catch per angler hour (CPAH) for copper rockfish for near and distant locations and shallow and deep locations by port, 1992.

	CPAH			
Port area	Near	Distant	Shallow	Deep
Fort Bragg	0.04	0.14	0.04	0.16
Bodega Bay	0.05	<0.01	0.02	-
San Francisco	0.23	0.19	0.16	0.61
Monterey	0.06	0.06	0.06	0.06
Morro Bay	0.12	0.06	0.10	0.11

TABLE 58. Mean length of copper rockfish for near (N) and distant (Dt) locations and shallow (S) and deep (Dp) locations by port, 1992.

	Number of fish measured					Mean total length (mm)				
Port area	All	N	Dt	S	Dp	All	N	Dt	S	Dp
Fort Bragg	41	28	10	20	8	401	389	445	394	430
Bodega Bay	7	2	2	6	-	383	362	472	365	-
San Francisco	208	39	104	13	-	380	373	390	314	-
Monterey	138	59	60	2	56	379	371	381	452	380
Morro Bay	342	275	26	44	46	372	373	363	363	392

TABLE 59. Catch per angler day (CPAD) and catch per angler hour (CPAH) for gopher rockfish by port, 1992.

Port area	CPAD	CPAH
Fort Bragg	0.06	0.02
Bodega Bay	0.01	<0.01
San Francisco	0.06	0.02
Monterey	0.08	0.02
Morro Bay	0.78	0.26

TABLE 60. Catch per angler hour (CPAH) for gopher rockfish for near and distant locations and shallow and deep locations by port, 1992.

	CPAH			
Port area	Near	Distant	Shallow	Deep
Fort Bragg	0.02	0.03	0.02	-
Bodega Bay	0.01	<0.01	0.02	-
San Francisco	0.01	0.02	0.07	-
Monterey	0.02	0.02	0.16	-
Morro Bay	0.25	0.29	0.57	<0.01

TABLE 61. Mean length of gopher rockfish for near (N) and distant (Dt) locations and shallow (S) and deep (Dp) locations by port, 1992.

	Number of fish measured					Mean total length (mm)				
Port area	All	N	Dt	S	Dp	All	N	Dt	S	Dp
Fort Bragg	12	10	-	10	-	288	289	-	289	-
Bodega Bay	4	-	-	4	-	301	-	-	301	-
San Francisco	23	3	6	23	-	260	257	259	260	-
Monterey	49	23	15	18	-	281	270	295	287	-
Morro Bay	743	605	88	126	2	275	274	287	284	264

TABLE 62. Catch per angler day (CPAD) and catch per angler hour (CPAH) for black rockfish by port, 1992.

Port area	CPAD	CPAH
Fort Bragg	0.69	0.26
Bodega Bay	0.50	0.17
San Francisco	0.27	0.08
Monterey	-	-
Morro Bay	0.08	0.03

TABLE 63. Catch per angler hour (CPAH) for black rockfish for near and distant locations and shallow and deep locations by port, 1992.

	CPAH			
Port area	Near	Distant	Shallow	Deep
Fort Bragg	0.21	0.54	0.29	-
Bodega Bay	0.65	0.07	0.52	-
San Francisco	-	0.12	0.35	-
Monterey	-	-	-	-
Morro Bay	0.01	0.10	0.10	<0.01

TABLE 64. Mean length of black rockfish for near (N) and distant (Dt) locations and shallow (S) and deep (Dp) locations by port, 1992.

	Number of fish measured					Mean total length (mm)				
Port area	All	N	Dt	S	Dp	All	N	Dt	S	Dp
Fort Bragg	153	121	24	145	-	348	334	398	345	-
Bodega Bay	138	11	12	138	-	372	400	447	372	-
San Francisco	42	-	37	42	-	302	-	308	302	-
Monterey	-	-	-	-	-	-	-	-	-	-
Morro Bay	51	26	23	33	-	302	286	317	310	-

TABLE 65. Catch per angler day (CPAD) and catch per angler hour (CPAH) for greenstriped rockfish by port, 1992.

Port area	CPAD	CPAH
Fort Bragg	-	-
Bodega Bay	0.10	0.03
San Francisco	0.06	0.02
Monterey	0.33	0.10
Morro Bay	0.06	0.02

TABLE 66. Catch per angler hour (CPAH) for greenstriped rockfish for near and distant locations and shallow and deep locations by port, 1992.

	CPAH			
Port area	Near	Distant	Shallow	Deep
Fort Bragg	-	-	-	-
Bodega Bay	-	0.04	-	0.05
San Francisco	<0.01	0.03	-	0.06
Monterey	0.09	0.13	-	0.16
Morro Bay	0.01	0.06	-	0.02

TABLE 67. Mean length of greenstriped rockfish for near (N) and distant (Dt) locations and shallow (S) and deep (Dp) locations by port, 1992.

	Number of fish measured					Mean total length (mm)				
Port area	All	N	Dt	S	Dp	All	N	Dt	S	Dp
Fort Bragg	-	-	-	-	-	-	-	-	-	-
Bodega Bay	7	-	7	-	-	301	-	301	-	-
San Francisco	16	2	14	-	-	283	283	284	-	-
Monterey	223	135	40	-	205	275	272	276	-	274
Morro Bay	56	22	9	-	10	276	273	295	-	282

TABLE 68. Catch per angler day (CPAD) and catch per angler hour (CPAH) for brown rockfish by port, 1992.

Port area	CPAD	CPAH
Fort Bragg	-	-
Bodega Bay	0.12	0.04
San Francisco	0.15	0.04
Monterey	0.02	0.01
Morro Bay	0.30	0.10

TABLE 69. Catch per angler hour (CPAH) for brown rockfish for near and distant locations and shallow and deep locations by port, 1992.

	CPAH			
Port area	Near	Distant	Shallow	Deep
Fort Bragg	-	-	-	-
Bodega Bay	0.19	0.01	0.13	-
San Francisco	0.06	0.04	0.13	-
Monterey	-	0.02	0.06	-
Morro Bay	0.03	0.42	0.37	<0.01

TABLE 70. Mean length of brown rockfish for near (N) and distant (Dt) locations and shallow (S) and deep (Dp) locations by port, 1992.

	Number of fish measured					Mean total length (mm)				
Port area	All	N	Dt	S	Dp	All	N	Dt	S	Dp
Fort Bragg	-	-	-	-	-	-	-	-	-	-
Bodega Bay	54	23	4	54	-	325	314	378	325	-
San Francisco	50	10	26	30	-	329	314	334	329	-
Monterey	15	-	15	6	-	341	-	341	365	-
Morro Bay	272	54	214	216	1	334	331	335	334	350

TABLE 71. Catch per angler day (CPAD) and catch per angler hour (CPAH) for yelloweye rockfish by port, 1992.

Port area	CPAD	CPAH
Fort Bragg	0.09	0.03
Bodega Bay	0.09	0.03
San Francisco	0.11	0.03
Monterey	0.06	0.02
Morro Bay	0.04	0.01

TABLE 72. Catch per angler hour (CPAH) for yelloweye rockfish for near and distant locations and shallow and deep locations by port, 1992.

	CPAH			
Port area	Near	Distant	Shallow	Deep
Fort Bragg	0.03	0.03	0.04	0.03
Bodega Bay	-	0.03	-	0.05
San Francisco	0.01	0.04	<0.01	0.09
Monterey	0.01	0.03	<0.01	0.02
Morro Bay	0.01	0.02	<0.01	0.04

TABLE 73. Mean length of yelloweye rockfish for near (N) and distant (Dt) locations and shallow (S) and deep (Dp) locations by port, 1992.

	Number of fish measured					Mean total length (mm)				
Port area	All	N	Dt	S	Dp	All	N	Dt	S	Dp
Fort Bragg	23	20	3	20	2	368	372	340	366	301
Bodega Bay	24	-	24	1	4	465	-	465	456	436
San Francisco	37	4	33	1	11	376	353	378	273	415
Monterey	39	11	13	-	11	454	433	456	-	470
Morro Bay	41	27	8	-	11	430	437	430	-	421

TABLE 74. Catch per angler day (CPAD) and catch per angler hour (CPAH) for China rockfish by port, 1992.

Port area	CPAD	CPAH
Fort Bragg	0.14	0.05
Bodega Bay	0.02	0.01
San Francisco	0.07	0.02
Monterey	0.02	0.01
Morro Bay	0.07	0.02

TABLE 75. Catch per angler hour (CPAH) for China rockfish for near and distant locations and shallow and deep locations by port, 1992.

	CPAH			
Port area	Near	Distant	Shallow	Deep
Fort Bragg	0.04	0.11	0.05	-
Bodega Bay	0.03	<0.01	0.02	-
San Francisco	0.02	0.02	0.05	-
Monterey	<0.01	0.01	0.03	-
Morro Bay	0.02	0.05	0.06	<0.01

TABLE 76. Mean length of China rockfish for near (N) and distant (Dt) locations and shallow (S) and deep (Dp) locations by port, 1992.

	Number of fish measured					Mean total length (mm)				
Port area	All	N	Dt	S	Dp	All	N	Dt	S	Dp
Fort Bragg	29	23	2	24	-	301	303	316	304	-
Bodega Bay	3	-	-	3	-	316	-	-	316	-
San Francisco	29	5	20	15	-	273	283	273	272	240
Monterey	14	4	9	4	-	290	276	299	281	-
Morro Bay	62	41	19	26	-	287	291	279	282	335

TABLE 77. Summary of total catch and effort estimates for CPFV anglers in northern and central California from 1992 logbook data.

	Port Areas						
	Northern* California	Fort Bragg	Bodega Bay	San Francisco	Monterey	Morro Bay	Total All Ports
Total no. trips	310	482	691	1,328	1,521	2,174	6,506
No. fish kept	15,904	52,611	230,081	332,629	355,609	553,937	1,540,771
No. angler days	1,723	4,528	16,400	25,764	27,391	45,052	120,858
No. hours fished	1,537	1,968	2,956	6,424	7,021	9,590	23,072
Average CPAD	9.2	11.6	14.0	12.9	13.0	12.3	12.7
Average CPAH	1.8	2.9	3.2	2.6	2.8	2.5	2.8
Total rockfish	15,152	51,637	223,884	309,391	338,328	538959	1,477,351
Total lingcod	575	746	5,230	9,634	7,719	12,576	36,480
Total other fish	177	228	967	13,604	9,560	2,402	26,938

* Northern California Group includes ports in Del Norte and Humboldt counties.

TABLE 78. Catch per angler day calculated from unadjusted logbook data and data collected onboard CPFVs, 1987-1992.

	1987	1988	1989	1990	1991	1992
Fort Bragg						
Logbook	11.8	12.3	12.9	12.8	11.5	11.6
Onboard	-	12.6	11.9	14.0	9.5	10.9
Bodega Bay						
Logbook	11.7	12.2	13.0	13.4	13.1	14.0
Onboard	-	10.9	12.4	11.2	14.0	12.6
San Francisco						
Logbook	10.8	10.5	11.9	12.0	10.6	12.9
Onboard	-	9.4	11.1	11.9	10.1	15.3
Monterey						
Logbook	12.2	11.8	11.8	11.3	11.7	13.0
Onboard	13.9	15.4	12.1	11.8	11.3	11.9
Morro Bay						
Logbook	10.9	9.9	12.2	12.3	11.6	12.3
Onboard	-	7.3	9.3	11.6	10.8	12.1

TABLE 79. Summary of total catch and effort estimates for CPFV anglers in northern and central California from 1992 logbook data, adjusted by sampling information and logbook compliance.

	Port Areas						
	Northern* California	Fort Bragg	Bodega Bay	San Francisco	Monterey	Morro Bay	Total All Ports
Total no. trips	310	927	950	1,847	2,765	3,240	10,039
No. fish kept	15,904	97,207	325,927	500,393	621,884	734,487	2,295,802
No. angler days	1,723	8,534	21,678	33,659	47,831	62,053	175,478
Average CPAD	9.2	11.4	15.0	14.9	13.0	11.8	13.1

* Northern California includes ports in Del Norte and Humboldt counties.

Table 80. Estimate of total CPFV catch of rockfishes and lingcod, based on adjusted logbook data and sampling information, from the port of Fort Bragg, 1992.

Species	Number in Thousands
Blue rockfish	37.5
Yellowtail rockfish	15.4
Widow rockfish	12.6
Rosy rockfish	5.4
Bocaccio	0.3
Chilipepper	---
Olive rockfish	1.6
Vermilion rockfish	0.9
Canary rockfish	6.5
Greenspotted rockfish	---
Starry rockfish	0.3
Copper rockfish	1.2
Gopher rockfish	0.5
Black rockfish	0.5
Brown rockfish	---
Greenstriped rockfish	---
Speckled rockfish	---
Yelloweye rockfish	0.8
Other rockfishes	1.8
Total rockfishes	90.3
Lingcod	1.8

Table 81. Estimate of total CPFV catch of rockfishes and lingcod, based on adjusted logbook data and sampling information, from the ports of Bodega Bay and Dillon Beach, 1992.

Species	Number in Thousands
Blue rockfish	57.7
Yellowtail rockfish	113.4
Widow rockfish	36.2
Rosy rockfish	4.2
Bocaccio	22.8
Chilipepper	20.2
Olive rockfish	5.2
Vermilion rockfish	2.0
Canary rockfish	19.9
Greenspotted rockfish	10.4
Starry rockfish	0.7
Copper rockfish	0.7
Gopher rockfish	0.3
Black rockfish	11.4
Brown rockfish	2.9
Greenstriped rockfish	2.3
Speckled rockfish	1.6
Yelloweye rockfish	2.0
Other rockfishes	2.1
Total rockfishes	315.3
Lingcod	5.2

Table 82. Estimate of total CPFV catch of rockfishes and lingcod, based on adjusted logbook data and sampling information, from the ports of Princeton, Berkeley, Emeryville and Richmond, 1992.

Species	Number in Thousands
Blue rockfish	134.6
Yellowtail rockfish	133.6
Widow rockfish	24.5
Rosy rockfish	53.5
Bocaccio	9.5
Chilipepper	---
Olive rockfish	10.0
Vermilion rockfish	6.0
Canary rockfish	21.5
Greenspotted rockfish	17.5
Starry rockfish	12.0
Copper rockfish	20.0
Gopher rockfish	1.5
Black rockfish	8.0
Brown rockfish	4.5
Greenstriped rockfish	2.0
Speckled rockfish	0.5
Yelloweye rockfish	3.5
Other rockfishes	4.5
Total rockfishes	467.7
Lingcod	14.5

Table 83. Estimate of total CPFV catch of rockfishes and lingcod, based on adjusted logbook data and sampling information, from the ports of Monterey and Santa Cruz, 1992.

Species	Number in Thousands
Blue rockfish	108.8
Yellowtail rockfish	104.5
Widow rockfish	48.5
Rosy rockfish	26.7
Bocaccio	47.3
Chilipepper	85.2
Olive rockfish	39.8
Vermilion rockfish	6.8
Canary rockfish	7.5
Greenspotted rockfish	2.4
Starry rockfish	2.0
Copper rockfish	9.3
Gopher rockfish	3.7
Black rockfish	---
Brown rockfish	1.2
Greenstriped rockfish	1.7
Speckled rockfish	6.2
Yelloweye rockfish	3.1
Other rockfishes	13.2
Total rockfishes	571.7
Lingcod	31.1

Table 84. Estimate of total CPFV catch of rockfishes and lingcod, based on adjusted logbook data and sampling information, from the ports of San Simeon, Morro Bay and Port San Luis, 1992.

Species	Number in Thousands
Blue rockfish	207.7
Yellowtail rockfish	130.7
Widow rockfish	54.5
Rosy rockfish	23.2
Bocaccio	29.8
Chilipepper	0.7
Olive rockfish	30.5
Vermilion rockfish	59.6
Canary rockfish	18.9
Greenspotted rockfish	8.0
Starry rockfish	18.9
Copper rockfish	18.9
Gopher rockfish	44.3
Black rockfish	4.4
Brown rockfish	17.4
Greenstriped rockfish	3.6
Speckled rockfish	4.4
Yelloweye rockfish	2.2
Other rockfishes	6.5
Total rockfishes	687.0
Lingcod	26.1

NOCAL CPFV SPORTFISH SURVEY

LOCATION SUMMARY

LOCA	FISHING TIME	MIN. DEPTH(FM)	MAX. DEPTH(FM)	FISHING TYPE	FISHING TACKLE

TRIPNOSAMP	
YR MO DAY	
BOAT NUMBER	
DEPART TIME	
RETURN TIME	
PORT	
LANDING	
TYPE OF TRIP	
PAID ANGLERS	
FREE ANGLERS	
OBSV ANGLERS	
SAMPLER	

FISHING TIME		TOTAL TIME (MIN)	FSHN TYPE	FSHN TCKL	#OBS ANGL	TOT #ANG	LOCATION		BOTTOM DEPTH(FM)	
START	END						CODE	LAT/LONG	MIN	MAX

Notes:

Boatnumber:

Samplers Name:

Sampler	DepTime	Boat Number	Port	Yr Mo Day	Trip No Samp

Species	Code	Kept	Released/Fate

Sampler | DepTime | Boat Number | Port | Yr Mo Day | Trip No Samp

South Location ____ to ____ North Location

SPECIES CODE | FATE

SPECIES COMMON NAME

Length / Freq	Length / Freq	Length / Freq	Length / Freq	Length / Freq

SPECIES CODE | FATE

SPECIES COMMON NAME

Length / Freq	Length / Freq	Length / Freq	Length / Freq	Length / Freq

SPECIES CODE | FATE

SPECIES COMMON NAME

Length / Freq	Length / Freq	Length / Freq	Length / Freq	Length / Freq

SPECIES CODE | FATE

SPECIES COMMON NAME

Length / Freq	Length / Freq	Length / Freq	Length / Freq	Length / Freq

SPECIES CODE | FATE

SPECIES COMMON NAME

Length / Freq	Length / Freq	Length / Freq	Length / Freq	Length / Freq

APPENDIX D. List of species observed caught by commercial passenger fishing vessel anglers in northern and central California, 1987 to 1992 (Legend: C = common, ≥1.0% of observed catch; I = incidental, <1.0% of observed catch; R = rare, one occurrence).

Common name	Scientific name	Occurrence 1987	1988	1989	1990	1991	1992
Rockfishes							
Aurora rockfish	*Sebastes aurora*		I				
Bank rockfish	*Sebastes rufus*	I	I	I			
Black rockfish	*Sebastes melanops*	I	C	C	C	C	C
Black-and-yellow rockfish	*Sebastes chrysomelas*	I	I	I		I	I
Blue rockfish	*Sebastes mystinus*	C	C	C	C	C	C
Bocaccio	*Sebastes paucispinis*	C	C	C	C	C	C
Brown rockfish	*Sebastes auriculatus*	I	C	C	C	C	C
Calico rockfish	*Sebastes dalli*		I	I			R
Canary rockfish	*Sebastes pinniger*	I	C	C	C	C	C
Chameleon rockfish	*Sebastes Phillips*			R			
Chilipepper	*Sebastes goodei*	C	C	C	C	C	C
China rockfish	*Sebastes nebulosus*	I	I	I	C	C	C
Copper rockfish	*Sebastes caurinus*	I	C	C	C	C	C
Cowcod	*Sebastes levis*	I	I	I	I	I	I
Flag rockfish	*Sebastes rubrivinctus*	I	I	I	I	I	C
Gopher rockfish	*Sebastes carnatus*	I	C	C	I	C	C
Grass rockfish	*Sebastes rastrelliger*	I	I	I		I	I
Greenblotched rockfish	*Sebastes rosenblatti*	I	I				
Greenspotted rockfish	*Sebastes chlorostictus*	C	C	C	C	C	C
Greenstriped rockfish	*Sebastes elongatus*	C	C	C	C	C	C
Halfbanded rockfish	*Sebastes semicinctus*	R	I				
Kelp rockfish	*Sebastes atrovirens*		I	I		I	I
Olive rockfish	*Sebastes serranoides*	I	C	C	C	C	C
Quillback rockfish	*Sebastes maliger*	I	I	I	I	I	C
Redstripe rockfish	*Sebastes proriger*	R				R	I
Rosethorn rockfish	*Sebastes helvomaculatus*	I	I	I	I	I	C
Rosy rockfish	*Sebastes rosaceus*	C	C	C	C	C	C
Sharpchin rockfish	*Sebastes zacentrus*		R				
Shortbelly rockfish	*Sebastes jordani*	I	I	I	I	I	I
Speckled rockfish	*Sebastes ovalis*	I	I	I	I	I	C
Splitnose rockfish	*Sebastes diploproa*	I	I	I	I		
Squarespot rockfish	*Sebastes hopkinsi*	I	C	I	I	R	C
Starry rockfish	*Sebastes constellatus*	C	C	C	C	C	C
Stripetail rockfish	*Sebastes saxicola*	I	I	I	I		R
Swordspine rockfish	*Sebastes ensifer*	I	I	I		I	
Tiger rockfish	*Sebastes nigrocinctus*					I	
Treefish	*Sebastes serriceps*					I	I
Vermilion rockfish	*Sebastes miniatus*	C	C	C	C	C	C
Widow rockfish	*Sebastes entomelas*	C	C	C	C	C	C
Yelloweye rockfish	*Sebastes ruberrimus*	I	I	I	I	I	C
Yellowtail rockfish	*Sebastes flavidus*	C	C	C	C	C	C
Other fishes							
Blue shark	*Prionace glauca*	R		I		I	I
Bonito shark	*Isurus oxyrinchus*						R

APPENDIX D. (continued).

Common name	Scientific name	Occurrence 1987	1988	1989	1990	1991	1992
Brown smoothhound	*Mustelus henlei*						R
Butter sole	*Iopsetta isolepis*			R			
Cabezon	*Scorpaenichthys marmoratus*	I	I	I	I	I	C
California halibut	*Paralichthys californicus*		R		I	I	I
California lizardfish	*Synodus lucioceps*		R	I			
California sheephead	*Semicossyphus pulcher*						I
English sole	*Parophrys vetulus*		R				
Fantail sole	*Xystreurys liolepis*	R					
Irish lord	*Hemilepidotus sp.*			R			
Jack mackerel	*Trachurus symmetricus*	I	I	I	I		C
Jacksmelt	*Atherinopsis californiensis*	I					
Kelp greenling	*Hexagrammos decagrammus*	I	I	I	I	I	C
King salmon	*Oncorhynchus tshawytscha*	I	I	I	I	I	C
Lingcod	*Ophiodon elongatus*	C	C	C	C	C	C
Longspine combfish	*Zaniolepis latipinnis*						R
Ocean whitefish	*Caulolatilus princeps*					I	I
Pacific barracuda	*Sphyraena argentea*						C
Pacific bonito	*Sarda chiliensis*	R					R
Pacific mackerel	*Scomber japonicus*	C	I	I	I	I	C
Pacific sardine	*Sardinops sagax*	R	I				I
Pacific hake	*Merluccius productus*	C	C	C	C	C	R
Pacific sanddab	*Citharichthys sordidus*	I	I	I	I	C	C
Petrale sole	*Eopsetta jordani*	I	I	I	I	I	I
Queenfish	*Seriphus*						R
Ratfish	*Hydrolagus colliei*		R				
Rock sole	*Lepidopsetta bilineata*	I	I	I	I	I	C
Rubberlip surfperch	*Rhacochilus toxotes*						R
Sablefish	*Anoplopoma fimbria*	C	I	I	I	I	I
Senorita	*Oxyjulis californica*						I
Silver salmon	*Oncorhynchus kisutch*			I			I
Soupfin shark	*Galeorhinus zyopterus*			R			
Speckled sanddab	*Citharichthys stigmaeus*	I		I	R		
Spiny dogfish	*Squalus acanthias*	I	I	I	I	I	I
Starry skate	*Raja stellulata*	R		R			
Striped surfperch	*Embiotoca lateralis*					R	
White croaker	*Genyonemus lineatus*	I	I	I		I	I
Wolf-eel	*Anarrhichthys ocellatus*		R	I	I		I
Yellowfin croaker	*Umbrina roncador*			I			

APPENDIX E. List of rockfishes known to occur in both sport and commercial fisheries in California (Data from Lea (1992).

COMMON NAME	SCIENTIFIC NAME
Species important in both sport and commercial fishery	
Black rockfish	*Sebastes melanops*
Black-and-yellow rockfish	*Sebastes chrysomelas*
Blue rockfish	*Sebastes mystinus*
Bocaccio	*Sebastes paucispinis*
Brown rockfish	*Sebastes auriculatus*
Canary rockfish	*Sebastes pinniger*
Chilipepper	*Sebastes goodei*
China rockfish	*Sebastes nebulosus*
Copper rockfish	*Sebastes caurinus*
Cowcod	*Sebastes levis*
Flag rockfish	*Sebastes rubrivinctus*
Gopher rockfish	*Sebastes carnatus*
Greenspotted rockfish	*Sebastes chlorostictus*
Kelp rockfish	*Sebastes atrovirens*
Olive rockfish	*Sebastes serranoides*
Rosy rockfish	*Sebastes rosaceus*
Speckled rockfish	*Sebastes ovalis*
Starry rockfish	*Sebastes constellatus*
Vermilion rockfish	*Sebastes miniatus*
Widow rockfish	*Sebastes entomelas*
Yelloweye rockfish	*Sebastes ruberrimus*
Yellowtail rockfish	*Sebastes flavidus*
Species important in sport fishery but not commercial fishery	
Calico rockfish	*Sebastes dalli*
Grass rockfish	*Sebastes rastrelliger*
Greenstriped rockfish	*Sebastes elongatus*
Quillback rockfish	*Sebastes maliger*
Species important in commercial fishery but not sport fishery	
Aurora rockfish	*Sebastes aurora*
Bank rockfish	*Sebastes rufus*
Blackgill rockfish	*Sebastes melanostomus*
Darkblotched rockfish	*Sebastes crameri*
Pink rockfish	*Sebastes eos*
Splitnose rockfish	*Sebastes diploproa*
Species taken only occasionally or rarely in both sport and commercial fishery	
Bronzespotted rockfish	*Sebastes gilli*
Chameleon rockfish	*Sebastes phillips*
Mexican rockfish	*Sebastes macdonaldi*
Pinkrose rockfish	*Sebastes simulator*
Redbanded rockfish	*Sebastes babcocki*

APPENDIX E (continued).

COMMON NAME	SCIENTIFIC NAME
Redstripe rockfish	*Sebastes proriger*
Rosethorn rockfish	*Sebastes helvomaculatus*
Sharpchin rockfish	*Sebastes zacentrus*
Stripetail rockfish	*Sebastes saxicola*
Tiger rockfish	*Sebastes nigrocinctus*

Appendix F. Maximum total length, by port area, of all species measured in CPFV catch, 1987 to 1992 (FB = Fort Bragg, BB = Bodega Bay, SF = San Francisco, MT = Monterey, and MB = Morro Bay).

Common name	Observed max. length (mm)					Observed max. length (in.)					Known max. length (in.)[1]
	FB	BB	SF	MT	MB	FB	BB	SF	MT	MB	
Rockfishes											
Aurora rockfish	-	-	-	350	-	-	-	-	13.8	-	15.5
Bank rockfish	357	455	503	503	-	14.1	17.9	19.8	19.8	-	20.1
Black rockfish	475	550	575	465	455	18.6	21.7	22.6	18.3	17.9	23.75
Black-and-yellow rockfish	309	-	345	358	330	12.2	-	13.6	14.1	13.0	15.25
Blue rockfish	468	491	527	457	500	18.4	19.3	20.7	18.0	19.7	21.0
Bocaccio	790	865	840	836	756	31.1	34.1	33.1	32.9	29.8	36.0
Brown rockfish	-	497	504	451	532	-	19.6	19.8	17.8	20.9	21.5
Calico rockfish	-	-	146	-	242	-	-	5.7	-	9.5*	9.8[2]
Canary rockfish	487	687	635	574	503	19.2	27.0	25.0	22.6	18.8	30.0
Chameleon rockfish	-	-	-	368	-	-	-	-	14.5	-	17.0
Chilipepper	-	556	530	535	495	-	21.9	20.9	21.0	19.5	22.0
China rockfish	395	416	412	359	401	15.6	16.4	16.2	14.1	15.8	17.0
Copper rockfish	560	519	582*	533	541	22.0	20.4	22.9*	21.0	21.3	22.5
Cowcod	-	663	-	710	686	-	26.1	-	28.0	27.0	37.0
Flag rockfish	-	410	462	451	440	-	16.1	18.2	17.8	17.3	25.0
Gopher rockfish	413*	319	425*	385	410*	16.3*	12.6	16.7*	15.2	16.1*	15.6
Grass rockfish	-	-	455	430	443	-	-	17.9	16.9	17.4	22.0
Greenblotched rockfish	-	-	-	475	285	-	-	-	18.7	11.2	19.0
Greenspotted rockfish	399	479	473	461	463	15.7	18.9	18.6	18.1	18.2	19.75
Greenstriped rockfish	285	392*	408*	397*	356	11.2	15.4*	16.1*	15.6*	14.0	15.0
Halfbanded rockfish	-	-	-	207	-	-	-	-	8.1	-	10.0
Kelp rockfish	-	-	386	345	414	-	-	15.2	13.6	16.3	16.75
Olive rockfish	463	503	514	557	560	18.2	19.8	20.2	21.9	22.0	24.0
Quillback	422	415	480	395	360	16.6	16.3	18.9	15.6	14.2	24.0
Redstripe rockfish	-	-	297	263	-	-	-	11.7	10.4	-	20.0
Rosy rockfish	335	346	353	344	352	13.2	13.6	13.9	13.5	13.9	14.2
Rosethorn rockfish	287	-	263	279	243	11.3	-	10.4	11.0	9.6	16.0
Sharpchin rockfish	-	-	303	-	-	-	-	11.9	-	13.0	13.0
Shortbelly rockfish	-	205	-	326*	-	-	8.1	-	12.8*	-	13.4
Speckled rockfish	-	470	455	463	429	-	18.5	17.9	18.2	16.9	22.0
Splitnose rockfish	-	-	-	378	-	-	-	-	14.9	-	18.0

APPENDIX F (continued).

Common name	Observed max. length (mm) FB	BB	SF	MT	MB	Observed max. length (in.) FB	BB	SF	MT	MB	Known max. length (in.)[1]
Squarespot rockfish	-	280	285	290*	258	-	11.0	11.2	11.4*	10.2	11.25
Starry rockfish	339	427	439	449	444	13.3	16.8	17.3	17.7	17.5	18.0
Stripetail rockfish	-	-	-	313	-	-	-	-	12.3	-	15.3
Swordspine rockfish	-	-	297	238	-	-	-	11.7	9.4	-	12.0
Tiger rockfish	-	-	449	305	-	-	-	17.7	12.0	-	24.0
Treefish	-	-	-	-	408	-	-	-	-	16.1	16.0
Vermilion rockfish	620	723	662	653	667	24.4	28.5	26.1	25.7	26.3	30.0
Widow rockfish	423	548	520	548	530	16.7	21.6	20.5	21.6	20.9	21.7
Yelloweye rockfish	649	715	673	688	610	25.6	28.1	26.5	27.1	24.0	36.0
Yellowtail rockfish	544	594	573	557	553	21.4	23.4	22.6	21.9	21.8	26.0
Other fishes											
Blue shark	-	-	1560	-	1600	-	-	61.4	-	63.0	156.0
Bonito shark	-	-	-	-	1700	-	-	-	-	66.9	156.0
Butter sole	-	-	-	318	-	-	-	-	12.5	-	21.75
Cabezon	453	416	661	628	617	17.8	16.4	26.0	24.7	24.3	39.0
California barracuda	-	-	-	-	871	-	-	-	-	34.3	48.0
California halibut	-	-	900	-	758	-	-	35.4	-	29.8	60.0
California sheephead	-	-	-	-	525	-	-	-	-	20.7	36.0
Fantail sole	-	-	-	363	-	-	-	-	14.3	-	21.0
Jack mackerel	-	661	713	674	411	-	26.0	28.1	26.5	16.2	32.0
Jacksmelt	-	-	-	388	-	-	-	-	15.3	-	17.5
Kelp greenling	386	386	438	483	375	15.2	15.2	17.2	19.0	14.8	21.0
King salmon	800	724	840	890	736	31.5	28.5	33.1	35.0	29.0	58.0
Lingcod	912	1170	1097	1028	940	35.9	46.1	43.2	40.5	37.0	52.0
Ocean whitefish	-	-	-	466	633	-	-	-	18.3	26.1	40.0
Pacific bonito	-	-	-	815	-	-	-	-	32.1	-	40.0
Pacific hake	-	-	504	736	362	-	-	19.8	29.0	14.3	36.0
Pacific mackerel	447	272	477	521	403	17.6	10.7	18.8	20.5	15.9	25.0
Pacific sanddab	-	-	415*	369	343	-	-	16.3*	14.5	13.5	16.0
Pacific sardine	-	-	-	275	-	-	-	-	10.8	-	16.0
Petrale sole	-	473	495	494	471	-	18.6	19.5	19.4	18.5	27.5
Ratfish	-	-	-	543	-	-	-	-	21.4	-	38.0

APPENDIX F (continued).

Common name	Observed max. length (mm) FB	BB	SF	MT	MB	Observed max. length (in.) FB	BB	SF	MT	MB	Known max. length (in.)[1]
Rock sole	-	-	478	499	473	-	-	18.8	19.6	18.6	23.5
Rubberlip surfperch	-	-	-	-	408	-	-	-	-	16.1	18.5
Sablefish	-	-	525	630	393	-	-	20.7	24.8	15.5	40.0
Silver salmon	656	-	-	668	-	25.8	-	-	26.3	-	38.5
Spiny dogfish	-	-	-	1005	1017	-	-	-	39.6	40.0	62.4
Striped surfperch	-	-	-	-	243	-	-	-	-	9.6	15.0
White croaker	-	-	302	301	287	-	-	11.9	11.9	11.3	16.3
Wolf eel	-	-	1424	1250	1285	-	-	56.1	49.2	50.6	80.0
Yellowfin croaker	-	-	297	-	-	-	-	11.7	-	-	20.1

[1] Maximum length as reported in Miller and Lea (1972)
* Exceeds maximum length as reported in Miller and Lea (1972)
[2] D. Pearson, National Marine Fisheries Service, Tiburon (pers. commun.)